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Ely Ranger District

July 2007



WHITE PINE & GRANT-QUINN OIL AND GAS LEASING PROJECT

Final Environmental Impact Statement



White Pine Range



Grant-Quinn Range

United States
Department of
Agriculture



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System
Lease Notice
meter
Modification
Management Indicator Species
Maximum Modification
Native American Graves
Protection and Repatriation Act
National Environmental Policy
Act
National Forest
National Forest Management Act
National Forest System
National Historic Preservation
Act
No Lease
No Surface Occupancy
Preservation

ROD
ROS
RPA
RVD
SHPO
SLT
SPM
SPNM
SUPO
T&E
TL
USFWS
VQO

Partial Retention
Prevention of Significant
Deterioration
Retention
Roadless Area Review and
Evaluation
Reasonably Foreseeable
Development Scenario
Loaded Natural
Record of Decision
Recreation Opportunity
Spectrum
Resource Planning Act
Recreation Visitor Day
State Historic Preservation
Office
Standard Lease Terms
Semi-primitive Motorized
Semi-primitive Non-motorized
Surface Use Plan of Operations
Threatened and Endangered
Timing Limitation
United States Fish and Wildlife
Service
Visual Quality Objective

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ELY RANGER DISTRICT**

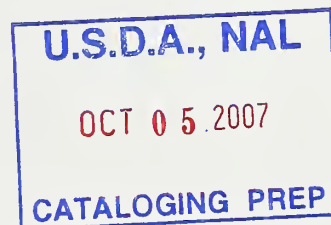
**WHITE PINE & GRANT-QUINN
OIL AND GAS LEASING PROJECT
FINAL ENVIRONMENTAL IMPACT STATEMENT**

Lead Agency: Humboldt-Toiyabe National Forest
USDA Forest Service (Intermountain Region)

Cooperating Agencies: Bureau of Land Management
Nevada Department of Wildlife
Nevada Division of Minerals

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Abstract:

The Ely Ranger District of the Humboldt-Toiyabe National Forest is undertaking this analysis to determine what non-wilderness lands within the White Pine and Grant-Quinn Divisions could be made available for oil and gas leasing, and, if made available, under what conditions leasing would be authorized. Regulations in 36 CFR 228.102 require the Forest Service to conduct an analysis prior to authorizing the Bureau of Land Management to offer National Forest System lands for oil and gas leasing. The Forest Service and the Bureau of Land Management agree that an important objective of this analysis should be to ensure that they provide an adequate environmental basis for all decisions to be made by the FS or the BLM with respect to offering National Forest System lands for lease.

In this analysis, the Forest Service considers a range of four (4) alternatives:

- Alternative 1: No Action / No Lease
- Alternative 2: *Forest Plan* with Maximum Resource Protection
- Alternative 3: *Forest Plan* with Moderate Resource Protection
- Alternative 4: *Forest Plan* (Proposed Action)

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SUMMARY:
WHITE PINE & GRANT-QUINN
OIL AND GAS LEASING PROJECT
FINAL ENVIRONMENTAL IMPACT
STATEMENT

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1. PROPOSED ACTION

The Proposed Action is to make all non-wilderness, NF System lands in the Project Area available for oil and gas leasing. The Currant Mountain, Grant, and Quinn Canyon Wildernesses have been withdrawn from leasing; and although there are no leasing-related decisions to be made within wilderness, potential indirect effects are considered. Leasing would follow management direction in the *Humboldt National Forest Land & Resource Management Plan (Forest Plan)* “Standards and Guidelines” (S&Gs) and the *Forest Plan’s* Appendix H: *Special Stipulations for Forest Service Mineral Leases* (see Appendix H of this document).

This proposed action was developed prior to the passage of the White Pine County Lands Bill” (Tax Relief and Health Care Act of 2006: Division C, Title III-White Pine County Conservation, Recreation, and Development) on December 20, 2006. Within the project area, the law established four new Wildernesses and expanded the existing Currant Mountain Wilderness. These designations totaled 129,709 acres. The legislation withdrew these new Wildernesses from mineral leasing (Section 323 [d]).

Due to this EIS being substantially complete at the passage of this Act, the EIS does not fully reflect the changed conditions due to new Wilderness designations. Any needed corrections would be addressed in the Record of Decision for this analysis.

2. PURPOSE OF AND NEED FOR ACTION

The purpose of this action is to facilitate the responsible exploration and development of oil and gas resources within the Project Area. Oil and natural gas are the primary sources of energy for mechanical equipment, lighting, heat, transportation, communications, and the production of food for people of the United States. Petroleum products are important components in agriculture, medicine, and the manufacture of fibers and plastics. Companies in the oil and gas industry continually seek new deposits of oil and gas, or seek to profitably extract the resources from previously uneconomical deposits.

The Forest Supervisor has several reasons to make lands available for lease at this time, including:

- 1) Outstanding requests for lease;
- 2) recent national interest in energy development;
- 3) anticipated requests for leases; and
- 4) implementing regulations.

3. DECISION FRAMEWORK

The Forest Supervisor of the H-T NF will decide which, and under what conditions, NF System lands within the Project Area will be administratively available for oil and gas leasing. (Lease stipulations as per 36 CFR 228.102(d) are detailed in Appendix A.) The Forest Service

proposes to amend the *Humboldt National Forest Land & Resource Management Plan (Forest Plan)* to incorporate the leasing availability decision and other site-specific changes as indicated in the analysis.

This decision framework is consistent with the direction provided in the MOU between the BLM and Forest Service concerning oil and gas leasing operations, *Forest Service Agreement No. 06-SU-11132428-052*, which became effective on April 14, 2006.

The leasing availability decision shall remain in effect until significant new information or circumstances cause the existing environmental analysis to be obsolete, at which time the Forest Service and BLM may conduct additional analysis regarding oil and gas leasing.

4. ALTERNATIVES

Three alternatives in addition to the proposed action were developed to address the range of possible options.

Alternative 1: No Action/No Lease. Reflects the effects of not leasing on Federal lands; the Forest Plan would be subsequently amended to reflect that no leases would be issued for oil and gas activities on NF System lands in the project area.

Alternative 2: Forest Plan with Maximum Resource Protection. This alternative was developed to provide resources a level of protection greater than that afforded by the Forest Plan and Standard Lease Terms (SLTs). There would be no surface disturbance to inventoried roadless areas. This alternative provides the most protection to wildlife species and habitat.

Alternative 3: Forest Plan with Moderate Resource Protection. This alternative was developed to have fewer constraints than the alternative providing maximum resource protection (Alternative 2) and still provide resource protection at a level greater than the Forest Plan alternative. There would be no surface disturbance in three selected inventoried roadless areas (IRAs) and the remaining would be open to surface occupancy.

Under all of the action alternatives (Alternatives 2 through 4), a stipulation for No Surface Occupancy (NSO) would apply only to the placement of well sites and production facilities such as tank batteries and compressor stations. *Forest Plan* standards and guidelines would govern the design, placement, and decisions related to any proposed roads or other linear facilities (pipeline and powerlines) that typically extend beyond the lease boundaries. Under all alternatives, the S&Gs of the *Forest Plan* will be followed. The alternatives do not amend any of the existing S&Gs.

Alternative 1 is the environmentally preferred alternative and Alternative 3 is the preferred alternative.

5. ANALYSIS

The area involved in this analysis is approximately 569,000 acres and includes the White Pine, Grant, and Quinn Canyon Ranges on the Ely Ranger District of the H-T NF. The Project Area

includes portions of White Pine, Lincoln, and Nye Counties and, except for a few small in-holdings within each unit, is primarily two separate blocks of NF System lands.

The analysis of the alternatives also considers the Reasonably Foreseeable Development (RFD) Scenario for the project area. This scenario describes the extent of oil and gas activity in the Project Area that could last for up to 35 years. The projected amount of activity in this scenario involves approximately 360 acres of disturbance as a result of exploration, mostly from road construction, and another 34 acres associated with development.

The four groups and associated issues are detailed below:

Group 1: Ecological Integrity and Biological Diversity

What are the potential effects of oil and gas leasing, exploration, development, and production on the ecological integrity and biological diversity of the Project Area?

Group 2: Geology, Soils, Ground Water, and Air Quality

What are the potential effects of oil and gas leasing, exploration, development, and production on air, water, and soil quality?

Group 3: Wilderness, Inventoried Roadless Areas, Recreational Setting, and Scenic Resources

What are the potential effects of oil and gas leasing, exploration, development, and production on Wilderness, scenery, inventoried roadless areas, and recreation settings in the Project Area?

Group 4: Socio-Economic, Heritage Resources, and Other Resource Values

What are the economic effects of oil and gas leasing, subsequent activities, and potential production in relation to other values?

6. ENVIRONMENTAL CONSEQUENCES

Chapter 4 of this FEIS displays the environmental consequences of the different alternatives in relationship to the issues identified above. These effects are briefly summarized below.

Group 1: Ecological Integrity and Biological Diversity

Under the no-action alternative (Alternative 1) there would be no effects to the ecological integrity and biological diversity of the project area. Under all of the action alternatives there would be some effects to the wildlife and plant species and habitats present in the Project Area due to the disturbances related to exploration and development. Also, under any of the action alternatives there is the potential for impacts to surface waters within the Project Area.

Group 2: Geology, Soils, Ground Water, and Air Quality

Under the no-action alternative (Alternative 1) there would be no effects to the geology, soils, ground water, or air quality of the Project Area. Under all of the action alternatives there would be some effects to the soil and ground water resources in the Project Area. Road building and

other ground disturbances could lead to increased soil erosion and the potential for slope instability. Potential impacts to groundwater quality and quantity could occur from drilling activities.

Group 3: Wilderness, Inventoried Roadless Areas, Recreational Setting, and Scenic Resources

Under the no-action alternative (Alternative 1) there would be no effects to Wilderness, IRAs, recreational setting, and scenic resources of the Project Area. Under all of the action alternatives there would be some effects to Wilderness, IRAs, recreational setting, and scenic resources of the Project Area. While all wilderness would remain legally unavailable to leasing, oil and gas operations adjacent to designated Wilderness could indirectly affect the character of the Wildernesses. Similarly, oil and gas operations in or adjacent to IRAs have the potential to impact the undeveloped character of these areas. These oil and gas operations also could impact the primitive and semi-primitive recreational setting and high quality scenic resources that visitors to the Project Area expect to find in rural Nevada.

Group 4: Socio-Economic, Heritage Resources, and Other Resource Values

Under the no-action alternative there would be no effects to the social, economic, heritage or other resource values of the Project Area. Under all of the action alternatives there would be some effects to the social, economic, heritage or other resource values that are present in the project area. Impacts to the social and economic components of affected counties and communities would occur from employment generated by the oil and gas activity as well as from the demand for goods and services generated by oil and gas development. Income generated from lease sales and royalties would also benefit the State of Nevada and the counties which may produce oil. Ground disturbance from road building, well-pad construction, and other related activities has the potential to impact heritage resources.

CHAPTER ONE: PURPOSE AND NEED

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1. INTRODUCTION

National Forest (NF) System lands often lie over geological formations containing oil and or natural gas. Sometimes “leases” are offered for these lands under mineral leasing laws to explore for and extract oil and gas. The Forest Service’s mission in minerals management is to support, facilitate, and administer the orderly exploration, development, and production of mineral and energy resources on NF System lands to help meet the present and future needs of the Nation (*Mining and Minerals Policy Act of 1970*, and *Forest Service Manual [FSM] 2802*, and *FS Strategic Plan* for FY 2004–2008).

The United States Department of Agriculture (USDA), Forest Service, Humboldt-Toiyabe National Forest (H-T NF); in conjunction with the United States Department of the Interior (USDI), Bureau of Land Management (BLM); is conducting an environmental analysis regarding oil and gas leasing. The analysis is to identify Federal lands with Federal mineral rights that should or should not be made available for oil and gas exploration, development, and production on the White Pine and Grant-Quinn Divisions of the Ely Ranger District in central Nevada (referred to as the *Project Area* throughout this document) in accordance with the *Mineral Leasing Act* of 1920 (see Figure 1-1). The Forest Service serves as both custodian of surface uses on NF System lands, and, in cooperation with BLM, manager of Federal subsurface minerals, including oil and gas lease operations. In this role, the Forest Service is responsible for identifying and assessing potentially significant environmental impacts and addressing issues associated with the proposed action presented in this document.

2. DOCUMENT STRUCTURE

The Forest Service has prepared this final environmental impact statement (FEIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and state laws and regulations. It discloses the direct, indirect, and cumulative environmental impacts that could result from the proposed action and alternatives, and is organized thusly:

- *Chapter 1: Purpose and Need for Action*
This chapter includes the history of the project proposal, the purpose of and need for the project, and the Agency's proposal for achieving that purpose and need.
- *Chapter 2: Alternatives, Including the Proposed Action*
Provides a more detailed description of the Agency's proposed action, and alternative methods for achieving the stated purpose. This section also details how the Forest Service informed the public of the proposal, and how the public responded. The alternatives were developed based on the significant issues raised by both the public and other agencies. This discussion also includes mitigation measures, and a summary table of the environmental consequences associated with each alternative.
- *Chapter 3: Affected Environment*
Describes the affected environment of the Project Area.
- *Chapter 4: Environmental Consequences*
Details the range of potential environmental consequences (also including the indirect and cumulative effects) that may result from all alternatives considered.
- *Chapter 5: Preparers and Contributors*
Provides a list of preparers and agencies consulted during the development of the analysis and the EIS document.
- *Appendices (A-J):*
The appendices provide more detailed information to support the analyses presented in the EIS.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record at the Ely Ranger District office in Ely, Nevada. (Information will be made available by alternative means, if necessary.)

Figure 1-1: White Pine and Grant-Quinn Divisions Project Area Map



3. GENERAL BACKGROUND: LEGISLATION AND POLICY _____

Statutes, including the *Federal Onshore Oil and Gas Leasing Reform Act of December 22, 1987* (Leasing Reform Act), establish and define the authority of the Forest Service and BLM to administer oil and gas leasing (the statutes are more fully described in Appendix B: *Acts of Authority and Mandates for the Forest Service and Bureau of Land Management*). Forest Service regulations implementing the statutes are in 36 *Code of Federal Regulations (CFR)* parts 228 and 261. The Forest Service regulations outline an incremental decision-making framework for the consideration of oil and gas leasing activities on NF System lands (36 CFR 228.102). In general, the steps undertaken are listed below. (This EIS covers only Step 1 and the remaining steps would be completed at a later date as necessary.)

- (1) Forest Service leasing analysis;
- (2) Forest Service notifies BLM of lands administratively available for leasing;
- (3) Forest Service reviews and verifies BLM's leasing proposals;
- (4) BLM assesses Forest Service's conditions of surface occupancy;
- (5) BLM offers leases;
- (6) BLM issues leases;
- (7) Forest Service reviews and approves lessee's *Surface Use Plans of Operations* (SUPO); and
- (8) BLM reviews and approves lessee's *Application for Permit to Drill* (APD).

The Forest Service's regulations (36 CFR 228) also outline two Agency decisions that may be subject to administrative review. The first decision (Step 1), documented in a *Decision Notice or Record of Decision*, is the "lands administratively available for lease" decision (36 CFR 228.102(d)). The second decision (Step 7) is associated with the Forest Service's approval of a SUPO (36 CFR 228.107). The authorized Forest officer will include in the public decision notice whether the decision may be appealed under the applicable Forest Service appeal procedures.

NF System lands available for leasing must be delineated in a Forest Plan. The current *Humboldt National Forest Land & Resource Management Plan* (Forest Plan), adopted in 1986, was completed prior to the passage of both the *Federal Onshore Oil and Gas Reform Act of 1987* and the new Forest Service leasing regulations of 1990. The availability analysis contained within the current *Forest Plan* does not meet the requirements under the current Forest Service leasing regulations; therefore, there is a need for an oil and gas leasing analysis.

4. PURPOSE OF AND NEED FOR ACTION _____

The purpose of this action is to facilitate the responsible exploration and development of oil and gas resources within the Project Area. Oil and natural gas are the primary sources of energy for mechanical equipment, lighting, heat, transportation, communications, and the production of food for people of the United States. Petroleum products are important components in agriculture, medicine, and the manufacture of fibers and plastics. Companies in the oil and gas industry continually seek new deposits of oil and gas, or seek to profitably extract the resources from previously uneconomical deposits.

The Forest Service has several reasons to make lands available for lease at this time, including:

- *Outstanding Requests For Leases.*
Since the passage of the *Leasing Reform Act*, companies have applied to BLM for leases on portions of the Project Area. Upon completion of this EIS, action may be taken on these lease proposals. The Forest Service, which needs to identify what lands are available for leasing before acting on outstanding leases, could not properly act upon these requests for lease(s) prior to this analysis.
- *Recent National Interest in Energy Development.*
The production, transmission, and conservation of energy are national priorities as reflected in the *Energy Policy Act of 2005*, the *Forest Service Energy Implementation Plan*, and the fourth goal of the *Forest Service Strategic Plan*. The fourth goal of the Strategic Plan calls for the Forest Service to “help meet energy resource needs.” The outcome under this goal describes the availability of National Forests and Grasslands for energy development and infrastructure. The Chief of the Forest Service has directed the field units to renew efforts to accomplish actions under the *Forest Service’s Strategic Plan and Energy Implementation Plan* that are key to reinforcing the Forest Service’s role in the *National Energy Policy*.
- *Anticipated Requests for Leases.*
Based on experience in adjacent BLM areas, the Project Area is considered to have low to medium potential for yielding oil and gas (see Figures 1-2 and 1-3); therefore, the Forest Supervisor will receive additional requests for leases. Currently, the Forest Supervisor(s) must respond to each request individually; and the decision must consider the aggregate and cumulative environmental effects of these and other operations. In order to plan for the orderly management of NF System lands, the Forest is conducting this analysis on an area-wide basis.
- *Implementing Regulations.*
36 CFR 228E, section 228.102(b) requires the Forest Supervisor to develop a schedule for conducting leasing analyses; section 228.102(c) identifies the requirement of these analyses.

5. PROPOSED ACTION

The proposed action (Alternative 4) is to make all non-wilderness NF System lands in the Project Area available for oil and gas leasing. The Currant Mountain, Grant, and Quinn Canyon Wildernesses have been withdrawn from leasing; and there are no leasing-related decisions to be made within wilderness areas. Leasing would follow management direction in the *Humboldt National Forest Land & Resource Management Plan (Forest Plan)* “Standards and Guidelines” (S&Gs) and the *Forest Plan’s* Appendix H: *Special Stipulations for Forest Service Mineral Leases* (see Appendix H, this document).

6. DECISION FRAMEWORK

The Forest Supervisor of the H-T NF will decide which, and under what conditions, NF System lands within the Project Area would be administratively available for oil and gas leasing. (Lease stipulations as per 36 CFR 228.102(d) are detailed in Appendix A.) The Forest Service proposes to amend the *Humboldt National Forest Land & Resource Management Plan (Forest Plan)* to incorporate the leasing availability decision and other site-specific changes as indicated in the analysis. This decision framework is consistent with the direction provided in the MOU between the BLM and Forest Service concerning oil and gas leasing operations, *Forest Service Agreement No. 06-SU-11132428-052* (effective April 14, 2006). The leasing availability decision shall remain in effect until significant new information or

circumstances cause the existing environmental analysis to be obsolete, at which time the Forest Service and BLM may conduct additional analysis regarding oil and gas leasing.

6.1. Roadless Area Protection

The 2005 *State Petitions Rule* for management and protection of inventoried roadless areas was in effect at the time the Draft EIS for this project was released to the public. On September 20, 2006, the United States District Court for the Northern District of California invalidated the 2005 *State Petitions Rule* and reinstated the 2001 *Roadless Conservation Rule*. The decision to be made would be in compliance with the *Roadless Area Protection Rule* in effect at the time the *Record of Decision* is issued.

6.2. White Pine County Lands Bill

In December 2006, the *White Pine County Conservation, Recreation and Development Act of 2006* was signed into law. Among other actions, this Act provided for the designation of certain lands within White Pine County as Wilderness. Within the Project Area of this EIS the following lands were set aside:

- Currant Mountain Wilderness Addition 10,697 acres
- Red Mountain Wilderness 20,490 acres
- Bald Mountain Wilderness 22,366 acres
- White Pine Range Wilderness 40,013 acres

These areas are delineated on the map entitled “Western White Pine County” and dated November 29, 2006 which is part of the congressional Record. The Act withdrew these areas from mineral leasing and entry; therefore, any decision made on lands availability would be consistent with this Act.

7. SCOPE OF THE PROPOSED ACTION

7.1. Geographic Scope

The Project Area totals about 569,917 acres, and encompasses the White Pine and Grant-Quinn Divisions on the Ely Ranger District of the H-T NF. It lies within White Pine, Nye, and Lincoln Counties (see Figure 1-1).

The White Pine Division (350,689 acres) encompasses the White Pine Range, including the Currant Mountains, Mokomoke Mountains, and Mount Hamilton. The Grant-Quinn Division (219,228 acres) includes the Quinn Canyon Range and most of the Grant Range. The Project Area is bounded on the east by the Jakes and White River Valleys and on the west by the Railroad and Newark Valleys. Most of the surrounding lands are public and managed by the BLM.

The northern part of the White Pine Division includes the White Pine Mining District and its complex pattern of private, intermingled ownership consisting primarily of mineral patents. There are isolated private land parcels throughout the Project Area that include mineral patents and homestead entries (see Tables 2-5 and 2-6).

7.2. EIS Scope

In addition to the Proposed Action, the scope of this EIS includes the effects of connected actions and cumulative actions.

Connected actions are those actions that:

- Are closely related to the Proposed Action and automatically triggered by the Proposed Action;
- Cannot or will not proceed unless other actions are taken previously or simultaneously; or
- Are interdependent parts of a larger action and depend on the larger action for their justification (40 CFR 1508.25).

Regulations (36 CFR 228.102(c)(4)) direct the Forest Service to consider the subsequent connected actions that would be authorized by a lease, and to analyze the reasonably foreseeable impacts of post-leasing activities. This consideration involves both connected actions associated with review and the approval of the APD and other associated plans of operation. These actions also meet the definition of connected actions in the procedural requirements for the NEPA (40 CFR 1502).

These expected actions are the basis of the environmental analysis from which the leasing decisions will be made. The decisions regarding which lands will be administratively available, as well as the subsequent decisions authorizing leases, are based upon analysis of the likely environmental effects of the connected actions.

Connected actions, which will be considered under each alternative in the EIS, include the post-leasing approval of SUPOs, and issuance of rights-of-way (ROW) authorizations for developments such as roads, powerlines, and pipelines, that must occur outside the physical bounds of the lease area and that are needed to support oil and gas exploration, development, and production from the lease. These actions may authorize or result in other activities such as drilling and/or construction of production facilities, roads, and pipelines as discussed in the *Reasonably Foreseeable Development Scenario* section below.

Cumulative actions are actions that, when viewed with other proposed actions, such as timber sales, wildlife improvements, may have ‘cumulatively significant’ impacts that should be discussed in the same EIS (40 CFR 1508.25).

A Forest-wide roads analysis was approved in January 2003, and is considered sufficient for the scale and scope of this analysis and decision. Therefore, no further roads analysis will be addressed in this EIS.

Approval of geophysical operations is outside the scope of this analysis since they are not lease-dependent and require separate approval under geophysical prospecting permits.

8. REASONABLY FORESEEABLE DEVELOPMENT SCENARIO

The reasonably foreseeable development (RFD) scenario represents a likely scenario of oil and gas development within the Project Area and provides the basis for the analysis of the environmental consequences in Chapter Four. The following RFD scenario for the Project Area is based on Great Basin geology, the oil and gas development history in Railroad Valley, and the oil and gas potential of the project area displayed in Figures 1-2 and 1-3.

Railroad Valley, located west of the Grant Range, contains the first producing oil fields within Nevada. Two wildcat wells drilled within the Project Area in the early 1990s are also considered; they were located in the northeast part of the White Pine Range. Appendix D provides a description of the standard operating procedures (SOPs) followed by BLM during the administration of a permit. These same operating procedures would apply to exploration, development, and production of oil and gas on NF System lands. Exploration within the Project Area may experience development similar to the following scenario.

8.1. Assumptions for Exploration

Initial geophysical surveys to interpret the overall geology may occur over the entire Project Area, especially along the outer edges of the mountain ranges. Once geologic structures of interest are located, specific areas would be surveyed more intensively and more frequently. The following assumptions will be used for this analysis:

- Exploration is expected to occur over 10 to 20 years.
- There would be up to 20 miles of seismic line surveyed per year, or an anticipated total of 100 miles. The total amount of disturbance could be up to 20 acres in a given year (or some years none), or a total of 200 acres. All of the area disturbed would be reclaimed each year. While other geophysical surveys are also expected, there should be minimal or no surface disturbance from these.
- Up to 2 wells per year would be drilled, or up to 20 total wells total.
- Approximately two of the total wells drilled would be potentially viable for production: one discovery well and one confirmation well.
- An estimated 18 wells would be reclaimed; the wells and associated access disturbance would likely be reclaimed the following year after drilling, and re-vegetation should meet the bond release criteria after 3 to 5 years.
- Drilling time would average 4 to 8 weeks per well.
- The average amount of water used to drill a well would be up to 10,000 gallons per day, or 420,000 gallons per well (about 1.3 acre-feet). This water would be obtained either from a nearby reservoir, an already established water well, a newly drilled water well, or some other water source. All water use would be in compliance with applicable State of Nevada water regulations.
- The average pad size for each well would be 2 acres, or a total of up to 4 acres of pad per year. Total disturbance would be up to 40 acres.
- The average access road to reach a well would average 25 feet wide by 5 miles long for road reconstruction, which would include an additional 10 feet beyond the 15-foot width of the existing road. Newly constructed roads would average 25 feet wide by 3 miles long. The running surface would average 15-feet wide for both types of roads. Road surfacing with gravel aggregate is expected to occur on 5 miles of road. There would be 12 acres of disturbance per year from road reconstruction and 18 acres per year from new road construction. Up to 300 total acres could be disturbed. Since access to the NF might cross BLM managed lands, some of this total projected disturbance may be on those lands.

Gravel aggregate for road construction or reconstruction would be obtained locally. The size of the aggregate quarry is expected to be 1 acre. Up to 20 quarries may be needed, for a total of 20 acres of disturbance. Table 1-1 shows maximum total acres expected to be disturbed for exploration.

Table 1-1: Maximum Disturbance Acres for Exploration

Type	Amount
Drill Pads	40 acres
Road Reconstruction	120 acres
Road Construction	180 acres
Quarry	20 acres
TOTAL	360 acres

8.2. Assumptions for Production

The average size for a producing oil and gas field is 640 acres. Generally, for wells less than 5,000-feet deep, there would be one well per 40 acres; and, for wells more than 5,000-feet deep, there would be one per 160 acres. Normally, drilling depths are greater than 5,000 feet; therefore, most of the well spacing can be expected to average one per 160 acres.

No more than one drilling rig would be in operation in any one field at a given time. Only limited reclamation work would occur until the producing field is abandoned. One producing field may be discovered within the Project Area; this field is projected to be equivalent in size and surface disturbance to the current Kate Springs Oil Field within Railroad Valley.

Inherent risk factors would usually limit drilling to depths of 8,000 feet, although some operators speculate that larger reservoirs would be encountered at greater depths (10,000 to 15,000 feet). The production life of a field would last from 1.5 to 35 years.

The following oil field development assumptions are based on estimated mineral potential, Project Area ground conditions, existing development of the Kate Springs Oil Field, and road availability:

- Eight wells would be drilled in the field, including four producing wells, one injection well, and three plugged and abandoned wells.
- Tank batteries and ancillary facilities would be placed on existing drill pads.
- The field would be 8 miles from a major existing road, and would require a major access road approximately 8 miles long and 35 feet wide. The access road would be surfaced with gravel aggregate and would require turnouts; running surface width would be 20 feet. This road would be reconstructed from an existing access road constructed during the exploration phase. Therefore, there would be 10 additional feet in width added to the existing 25 feet, resulting in an additional 10 acres of disturbance.
- Three miles of 25-foot-wide service road surfaced in gravel aggregate would be required; adding about 9 acres of disturbance.
- Drill pads would be 200 by 250 feet (1.1 acres) and surfaced with gravel aggregate.
- Two miles of pipeline would be required; the resulting disturbance would be 15-feet wide.
- Gravel would be obtained locally from Forest Service, BLM, or private lands; quarry size is estimated at 2 acres.

Table 1-2 lists maximum total acres disturbed for the expected oil field development.

Table 1-2: Maximum Disturbance Acres for Production

Type	Amount
Well Pads	9 acres
Service Roads	9 acres
Major Access	10 acres
Pipeline	4 acres
Gravel Pit	2 acres
TOTAL	34 acres

A more detailed description of typical oil and gas activity is included in Appendices C, D, and E.

8.3. Assumptions for Environmental Protection and Reclamation

At the analysis stage for both exploration and development projects, the appropriate environmental protection measures (such as best management practices, mitigation, and standard operating procedures) and reclamation measures would be identified through the analysis process. All measures would be incorporated in the SUPOs and development plans. Key elements that would be considered in future site-specific analysis include:

- Noxious weed prevention and control
- Road maintenance standards
- Erosion control measures
- Spill prevention measures and controls
- Wildlife mitigation
- Water quality protection measures
- Reclamation of all surface disturbances
- Plugging and closure of all drill holes and wells
- Visual quality protection
- Waste management options

Guidance and sources of information would follow current Federal and state laws, regulations, and policies in effect at that time; they include, but would not be limited to:

- Forest Plans for the H-T NF
- *Profile of the Oil and Gas Extraction Industry* (October, 2000), EPA reference number: EPA/3 1 O-R-99-006
- New BLM and USDA Forest Service Oil and Gas *Gold Book* (Operators Guide)
- Forest Service *Low-Volume Roads Engineering BMP Field Guide* and Forest Service *Water-Road Interaction Technology Series*

- EPA's *Construction Site Storm Water Runoff Control BMP Fact Sheets*

8.3.1. Monitoring

Monitoring of all oil and gas exploration and development activities would be conducted by the Forest Service, BLM, and other state, local, and Federal agencies. Monitoring would focus on compliance with approved plans and permits and resource protection.

Figure 1-2: White Pine Division Oil and Gas Potential

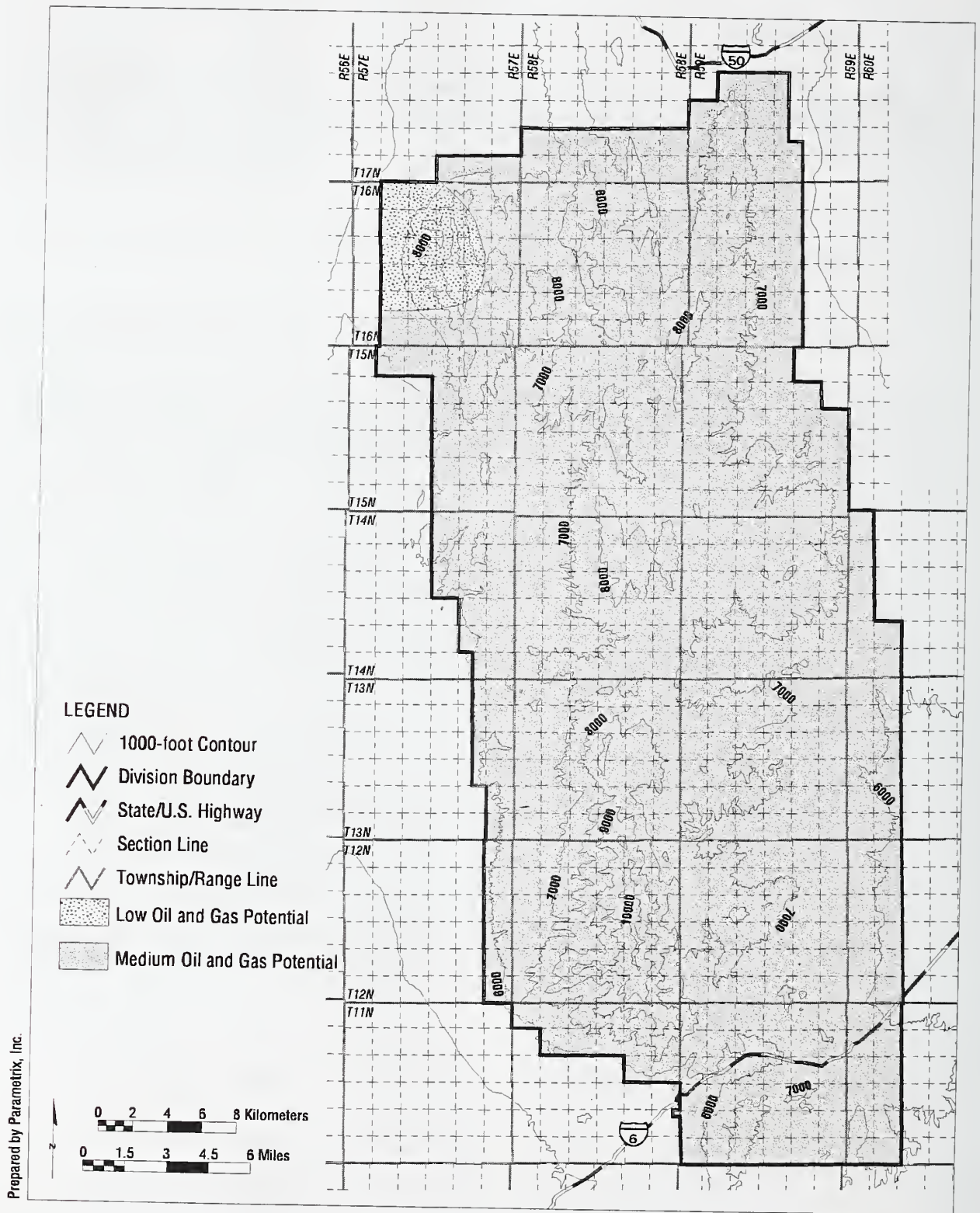
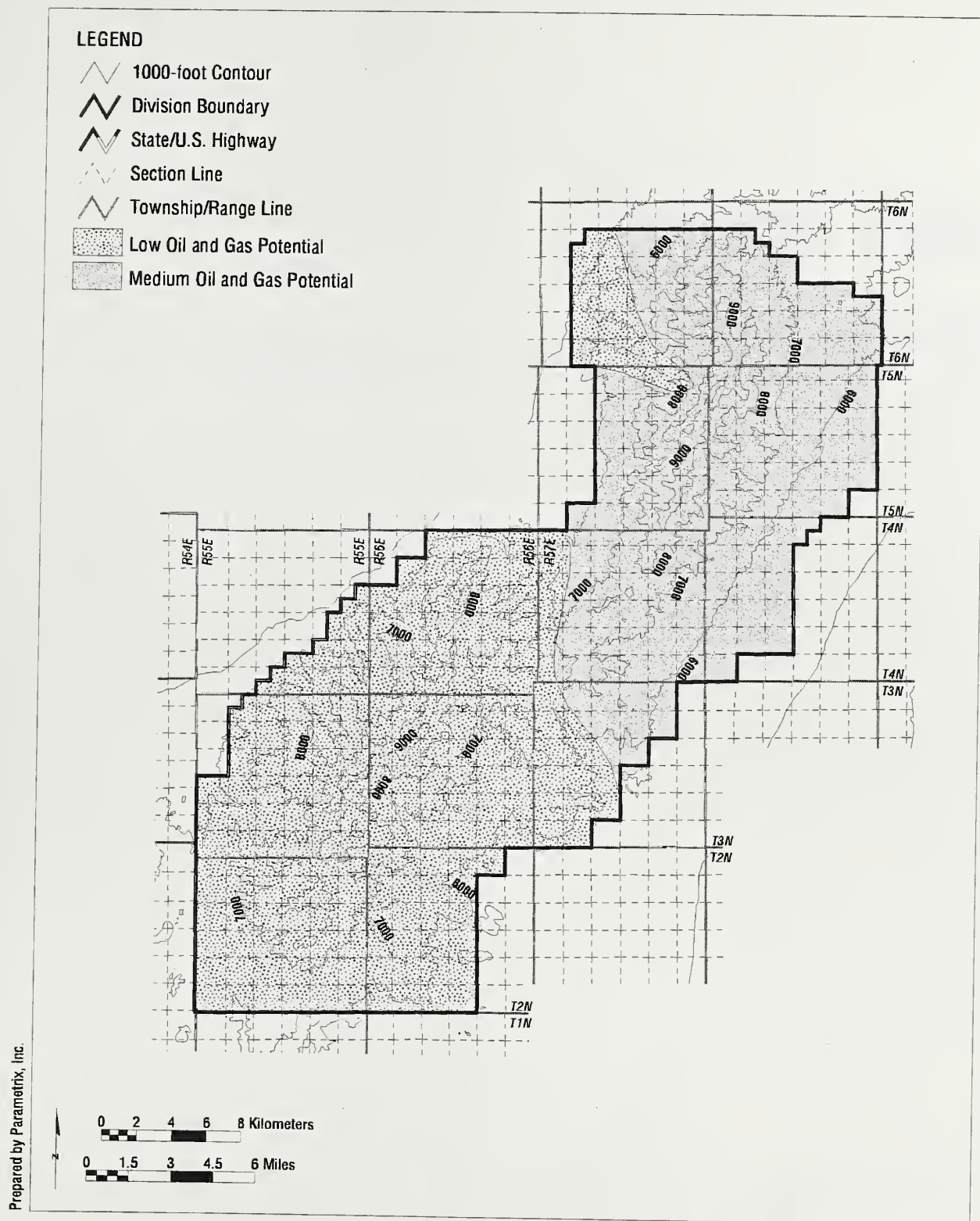


Figure 1-3: Grant-Quinn Division Oil and Gas Potential



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CHAPTER TWO: ALTERNATIVES

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1. INTRODUCTION

This chapter describes the public and Tribal involvement processes, the issues identified during scoping, the development of the alternatives, and details of each alternative. Various efforts were made to involve the public, local governments, and Tribal governments in the planning process for this analysis. These efforts are summarized below; a copy of all replies and comments is included in the project record at the Ely Ranger District office in Ely, Nevada.

The description of the alternatives does not include changes to lands status made through the adoption of the *White Pine County Lands Bill* that was signed into law in December of 2006.

2. PUBLIC INVOLVEMENT

Notice of Intent. A notice of intent (NOI) to prepare an environmental impact statement (EIS) was published in Volume 64, Number 69, page 17611 of the *Federal Register* on April 12, 1999.

Public Mailings. Scoping, the beginning of environmental analysis, involves the solicitation of comments from the various government agencies, interested organizations, and individuals. This information assists in incorporating the most accurate and current environmental data and public opinion into the planning and decision-making process. A scoping newsletter was sent to the approximately 80 parties on the mailing list for the project to inform the public of the Forest Service's intent to conduct an environmental analysis and to solicit public comment to identify specific issues to be addressed.

Since the project had been "on hold" for 5 years, additional requests for comments were sent out on June 18, 2004, to approximately 220 potentially interested organizations, individuals, and governments.

Notice of Availability. The notice of availability (NOA) for the release of the draft EIS was published in the *Federal Register* (Volume 70, Number 165, page 50346) on August 26, 2005. Publication initiated a 45-day public comment period.

Legal Notice for Opportunity to Comment. A legal notice for opportunity to comment was published in the Ely Times and Elko Daily Free Press on September 2, 2005.

County Coordination. The county governments for White Pine, Lincoln, and Nye Counties have received all public mailings described above. The District Ranger and District Staff met with two of White Pine County Commission on August 16, 2005, to discuss and present information pertaining to the preparation of the Martin Basin EIS.

3. TRIBAL INVOLVEMENT

Tribal governments have a special and unique legal and political relationship with the United States government (as reflected in the United States Constitution, treaties, statutes, court decisions, Executive orders, and memoranda); hence, Federal agencies have a duty to consult, coordinate, and communicate with Indian Tribes on a government-to-government basis. The Forest Service also has a duty to consult with Indian Tribes when their policies and actions affect the Tribes.

Efforts were made to involve local Tribal governments and to solicit their input regarding the proposed action. The draft EIS was mailed to local Tribal governments on August 18, 2005. Follow-up meetings were held with various representatives of Tribal governments throughout the process including:

October 14, 2005 – Yomba Shoshone Tribe
July 26, 2005 – Duckwater Shoshone Tribe
June 14, 2005 – Ely Shoshone Tribe

4. ISSUES

The first interdisciplinary team (ID team) reviewed, analyzed, and summarized the public comments during a team meeting held June 15–16, 1999. The issues found to be within the scope of the project were then organized into four general groups. After additional scoping was initiated on July 28, 2004, new comments were considered and relevant issues incorporated into the four issue groups as follows.

4.1. Group 1: Ecological Integrity and Biological Diversity

What are the potential effects of oil and gas leasing, exploration, development, and production on the ecological integrity and biological diversity of the Project Area?

The potential effects to the natural ecological integrity of the Project Area include effects to terrestrial and aquatic ecosystems, threatened and endangered species, wetland and riparian habitat vegetation communities, noxious weeds, and the biological diversity of the Project Area. Individuals were concerned that oil and gas activities could alter the biological diversity of the area by changing composition, abundance, and/or distribution of plants and animals, with the potential result of habitat fragmentation. The threatened, endangered, and sensitive species of particular concern are greater sage-grouse, pygmy rabbits, and northern goshawks. Other species of concern are bighorn sheep, elk, mule deer, neotropical migratory birds, and raptors.

Activities resulting in erosion or other displacement of soils, such as stream crossings, may cause sedimentation in streams with consequent degradation of water quality and aquatic habitat including fisheries).

4.2. Group 2: Geology, Soils, Ground Water, and Air Quality

What are the potential effects of oil and gas leasing, exploration, development, and production on air, water, and soil quality?

Under this issue, soil quality and stability, ground water quality and quantity, and air quality are considered. Ground-disturbing activities, including roads associated with oil and gas exploration, development, and production, will disturb and could cause adverse effects to soils (especially on steep slopes), air, and ground water. Potential effects to soils include compaction, displacement, and loss of vegetative cover resulting in erosion. Surface water quality is considered a component of the aquatic and riparian ecosystems. Soil-disturbing activities, such as construction, traffic, and, to a limited extent, drilling, could create fugitive dust that could temporarily degrade air quality and be a nuisance. Potential reclamation problems could result in areas of sensitive soils and steep slopes.

Well drilling, and the development and operation of production wells, could negatively affect groundwater quality when hazardous materials are not handled properly (e.g., fuels, drilling chemicals, produced oil, and residuals from the oil production process) or if saline water from the oil production process is improperly disposed. Also, additional degradation of groundwater quality may occur if pressurized groundwater and oil zones are not controlled at depth, which could result in well blowouts and leakage into fresh-water aquifers.

Oil and gas activities could also have an affect on groundwater quantity if pressurized groundwater zones and oil zones at depth, and groundwater withdrawal from water supply wells and springs are not controlled.

4.3. Group 3: Wilderness, Inventoried Roadless Areas, Recreational Setting, and Scenic Resources

What are the potential effects of oil and gas leasing, exploration, development, and production on wilderness, scenery, inventoried roadless areas, and recreation settings in the Project Area?

This issue highlights the potential effects of oil and gas exploration, development, and production on wilderness, IRAs, scenery, and recreation setting. It also specifically addresses the effects of introduced noise and light. There is concern that the outstanding sense of solitude in the Project Area would be degraded from the various noises associated with exploration and development. Further concerns involve the introduction of lights at exploration and developments and their potential to both impair the outstanding brilliance of night skies and degrade the sense of solitude in the Project Area.

Roads could be built into areas that are currently difficult to access, providing unprecedented access for motor vehicles and promoting increased human activity. In addition, road densities could be increased by construction of access roads. Oil and gas-related facilities constructed in these areas also could alter the visual characteristics and aesthetics of the region. Publics who favor rustic, dispersed recreation opportunities oppose developments because they believe recreational uses are incompatible with oil and gas exploration and production.

Many are concerned that protecting roadless characteristics will limit access—to the detriment of the economic health of local communities and the State—and prevent future motorized recreational access. These publics favor the opportunity for increased access into these areas by leaving roads open, reclaiming well sites when oil and gas activities cease, and developing recreation sites such as trail heads.

There were also concerns regarding potential impacts to the roadless areas identified in the 1998–1999 inventory of roadless areas. Some felt new roads in these areas would result in increased human intrusion and cause irreparable changes to the roadless resource. They believe the values of solitude provided by these areas are too unique to lose. Respondents suggested the analysis include cumulative effects to the roadless areas, considering past and reasonably foreseeable future activities (e.g., oil and gas activities, timber harvest, grazing, and use of off-road vehicles). Exploration and development in the roadless areas would likely limit future wilderness designations.

4.4. Group 4: Socio-economic, Heritage Resources, and Other Resource Values

What are the economic effects of oil and gas leasing, subsequent activities, and potential production in relation to other values?

This issue addresses the potential social and economic effects of oil and gas activities, primarily production, to local and state economies. It also concerns forest access, the transport of hazardous materials, heritage resources and traditional cultural properties, public safety, and grazing.

Cultural resources were not identified as a major issue during the public scoping process; however, there were some concerns regarding how oil and gas leasing may affect significant cultural or historic sites that exist within the Project Area.

There are also concern about effect(s) that oil and gas leasing, exploration, development, and production may have on livestock and grazing within the Project Area.

Some respondents felt that development would produce economic benefits from tax revenues, jobs, goods, and services for the affected state and local economies, as well as the Federal government. Some felt such benefits would alleviate tax burdens and provide needed funds for schools. Also, an increase in domestic production of energy resources would reduce the Nation's dependence on foreign energy resources.

Other concerns were expressed that the potential economic benefits would be negligible compared to the potential effects to the natural resource values of the area (i.e., that the environmental cost would greatly outweigh the economic benefit). Conversely, concerns were also expressed that overly-restrictive lease stipulations imposed to protect surface resources could limit opportunities or even preclude oil and gas exploration and development.

5. DEVELOPMENT OF ALTERNATIVES

The alternatives were developed in response to the issues and to ensure that a full range of leasing options was addressed for the Project Area. These leasing options, including all stipulations, would apply to both exploration activities and development activities covered under all leases.

The possible leasing mitigation options analyzed are:

- *No Lease (NL)*. No new leases would be authorized.
- *Standard Lease Terms (SLT)*. No special limitations would be applied and operations are only restricted by current laws, regulations, and Onshore Orders. This allows delaying activities for up to 60 days or moving a well location up to 200 meters (or 656 feet) to address previously unanticipated site-specific needs (BLM Regulations at 43 CFR 3101.1-2).
- *Lease Notice (LN)*. Provides information to a lessee concerning resources that are protected by law or regulation, thereby making a specific lease stipulation unnecessary.

- *Stipulations.* Stipulations are conditions that are made part of the lease prior to issuance in order to protect surface resources. The three categories of standardized stipulations are:

No Surface Occupancy (NSO): Occupancy of leased land for facilities such as well sites, tank batteries, or similar facilities would not be allowed for the protection of specific surface resources such as inventoried roadless areas, greater sage-grouse leks, raptor nest buffers, and bighorn sheep habitat.

Controlled Surface Use (CSU): Use and occupancy is allowed, but restricted to mitigate effects on particular resources; such as requiring operations to meet a visual quality objective, limiting the amount of vehicle traffic on a particular road for limiting disturbance to wildlife, and limiting the number of drilling operations at any one time within a given area for wildlife and habitat protection.

Timing Limitations (TL): Activities would be restricted or prohibited during key periods for wildlife protection such as greater sage-grouse brooding, elk calving, and neotropical migratory birds nesting.

Tables 2-1, 2-2, and 2-3 list the stipulations developed for each alternative, and describe waivers, modifications, and exceptions to the stipulations that may be allowed in certain cases. Appendix A provides additional information on the use of stipulations.

The use of waivers, exceptions, and modifications for specific resources is allowed under Forest Service regulations at 36 CFR 228.104. These regulations state:

(a) *General.* An operator submitting a surface use plan of operations may request the authorized Forest officer to authorize the Bureau of Land Management to modify (permanently change), waive (permanently remove), or grant an exception (case-by-case exemption) to a stipulation included in a lease at the direction of the Forest Service. The person making the request is encouraged to submit any information which might assist the authorized Forest officer in making a decision.

(b) *Review.* The authorized Forest officer shall review any information submitted in support of the request and any other pertinent information.

(1) As part of the review, consistent with 30 U.S.C. 226 (f)–(g), the authorized Forest officer shall ensure compliance with the National Environmental Policy Act of 1969 (42 U.S.C. 4331 *et seq.*) and any other applicable laws, and shall ensure preparation of any appropriate environmental documents.

(2) The authorized Forest officer may authorize the Bureau of Land Management to modify, waive, or grant an exception to a stipulation if:

- (i) The action would be consistent with applicable Federal laws;
- (ii) The action would be consistent with the current forest land and resource management plan;
- (iii) The management objectives which led the Forest Service to require the inclusion of the stipulation in the lease can be met without restricting operations in the manner provided for by the stipulation given the change in the present condition of the surface resources involved, or given the nature, location, timing, or design of the proposed operations; and
- (iv) The action is acceptable to the authorized Forest officer based upon a review of the environmental consequences.

(c) *Other agency stipulations.* If a stipulation was included in a lease by the Forest Service at the request of another agency, the authorized Forest officer shall consult with that agency prior to authorizing modification, waiver, or exception.

(d) *Notice of decision.* (1) When the review of a stipulation modification, waiver, or exception request has been completed and the authorized Forest officer has reached a decision, the authorized Forest officer shall promptly notify the operator and the appropriate Bureau of Land Management office, in writing, of the decision to grant, or grant with additional conditions, or deny the request.

A full range of these leasing options was incorporated into the development of alternatives so that the comparison of alternatives would disclose which specific lease stipulations are necessary and justifiable in accordance with 36 CFR 228.102(c). Appendix A provides a full description of the leasing options. These leasing options for the various site-specific resources were then combined into a reasonable range of alternatives that respond to the issues for the entire analysis area.

Site-specific environmental analysis would be completed when surface use plans are submitted for review and approval. Appropriate stipulations would then be clarified to address the project-level impacts.

Table 2-4 lists each resource and shows the difference in stipulations and the acres affected. The total affected resource acres in this table are greater than the total Project Area acres because there is considerable overlap of stipulations from the various resources, resulting in the same acres being counted more than once. The alternatives do not change the number of acres affected for each resource; only reflect how activity on those acres is managed through the application of different stipulations. The resource concern with the most restrictive stipulation determines how that acre is managed.

6. ALTERNATIVES CONSIDERED IN DETAIL

Alternatives range from Alternative 1 (No Action/No Lease), to Alternative 4 (Forest Plan, Proposed Action) (Figures 2-1, 2-2, 2-4, 2-5, 2-8, 2-9, 2-10, and 2-11 display the alternatives). Under all of the action alternatives (Alternatives 2 through 4), the stipulations would apply only to lease-related activities such as the placement of drill and well sites and production facilities such as tank batteries and compressor stations. Forest Plan S&Gs would govern the design, placement, and decisions related to any proposed roads or other linear facilities (pipeline and powerlines) that typically extend beyond the lease boundaries; these standards also apply when the linear feature is on the lease.

6.1. Alternative 1 (No Action/No Lease)

The No Action/No Lease alternative, which is required by CEQ NEPA Regulations (40 CFR 1502.14), would have no lands available for leasing, and, therefore, no leases would be issued. Forest Service direction for implementing the requirements of NEPA identifies two options for defining the no-action alternative: (1) No change from current management direction or from the current level of intensity, and (2) no action or activity would take place because no leases would be issued. The second option is used for this analysis (see Figures 2-1 and 2-2).

Under the No Action/No Lease alternative, the Forest Plan would be amended to reflect that no lands would be made available for leasing, and, therefore, no leases would be issued for oil and gas activities on NF System lands in the Project Area.

Figure 2-1: White Pine Division – Alternative 1: No Action / No Lease

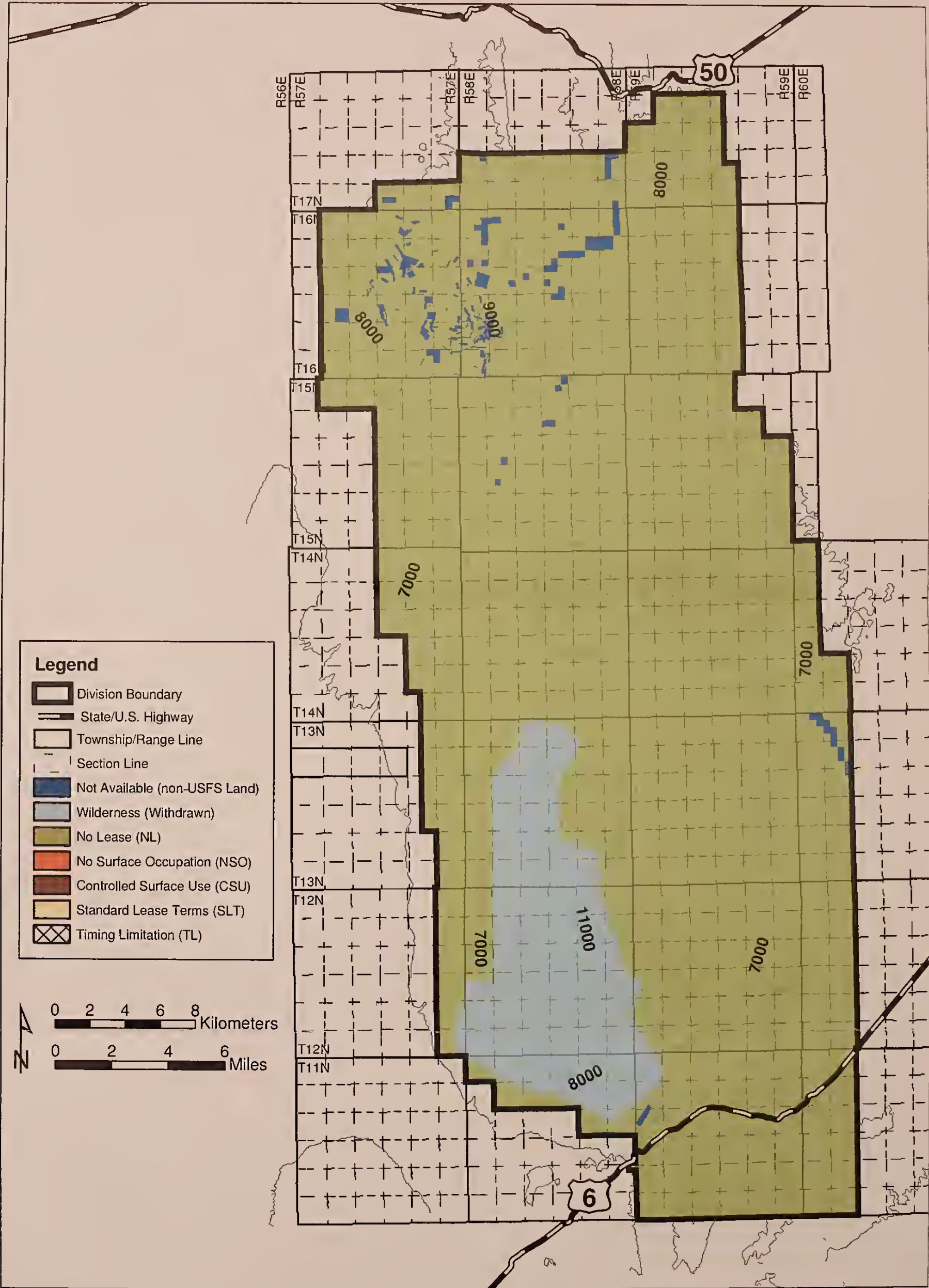
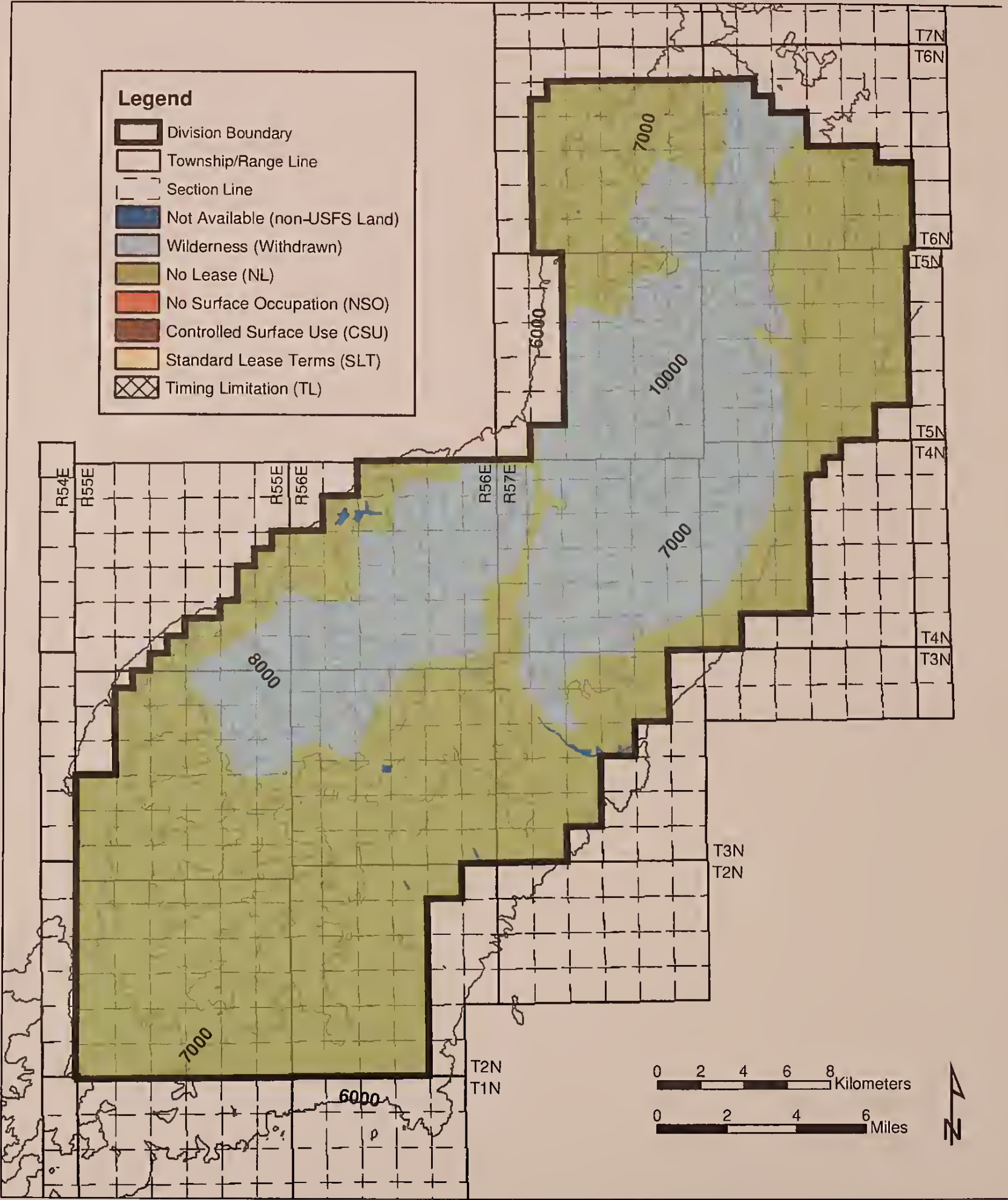


Figure 2-2: Grant-Quinn Division – Alternative 1: No Action / No Lease



6.2. Alternative 2 (Forest Plan with Maximum Resource Protection)

This alternative protects resources of concern at a higher level than under the Forest Plan and Standard Lease Terms (SLTs). A new stipulation was developed to address and mitigate impacts to the resource in question when Forest Plan direction or SLTs would not adequately protect resource values. The different resources associated with major leasing restrictions, the type of stipulation (Table 2-1), and the approximate acreage for the restriction are summarized in Table 2-4.

To protect IRAs, a NSO restriction is proposed for areas 800 meters (2,625 feet) inside the roadless area boundary. The center portion of the interior roadless areas farther than 800 meters (2,625 feet) from the roadless area boundaries would not be offered for lease (see Figure 2-3). The NSO distance restriction of 800 meters is typically used when a resource needs to be protected from oil and gas related activity. The distance is based on: (1) the minimum distance needed to protect a resource from noise, dust, and visual impacts; (2) environmental factors such as terrain and vegetation; and (3) a distance that oil and gas drilling rigs can easily exploit an oil and gas resource that is under leases with a NSO stipulation.

Under this alternative, all of the NF System lands within the analysis area would be administratively available for leasing except the Currant Mountain, Grant Range, Quinn Canyon Wildernesses, new wilderness designated under the *White Pine County Lands Bill*, and portions of IRAs as described previously (see Figures 2-4 and 2-5). Lands available for leasing would have various levels of protection: NSO, Controlled Surface Use, Controlled Surface Use with Timing Limitation, Standard Lease Terms, and Standard Lease Terms with Timing Limitations (see Tables 2-5 and 2-6).

Lands available for leasing under this alternative total 319,424 acres (see Tables 2-5 and 2-6).

The objective of this alternative is to provide a high level of protection to resources of concern. Leasing would be based on stipulations identified to prevent unacceptable or unnecessary impacts to natural resource values from oil and gas operations. The lease stipulations to control surface-disturbing activities were based on analysis of updated resource inventory data, public comment, and applying the resource condition objectives outlined in the *Humboldt Forest Plan*.

Under this alternative, the resources and land uses within the Project Area identified for major restrictions to leasing include: critical wildlife habitat (greater sage-grouse, raptors, pygmy rabbit, elk, bighorn sheep, mule deer, and neotropical migratory birds); certain vegetation communities (mountain mahogany, aspen, sub-alpine, and bristlecone); rare plants (Region 4 sensitive species, Nevada listed species, and threatened and endangered species); riparian areas; areas with high erosion hazard; inventoried roadless areas; primitive and semi-primitive recreation settings; heritage resources; and administrative and recreation sites.

Figure 2-3: White Pine and Grant-Quinn Divisions – Alternative 2 and 3 Roadless Stipulation Schematic

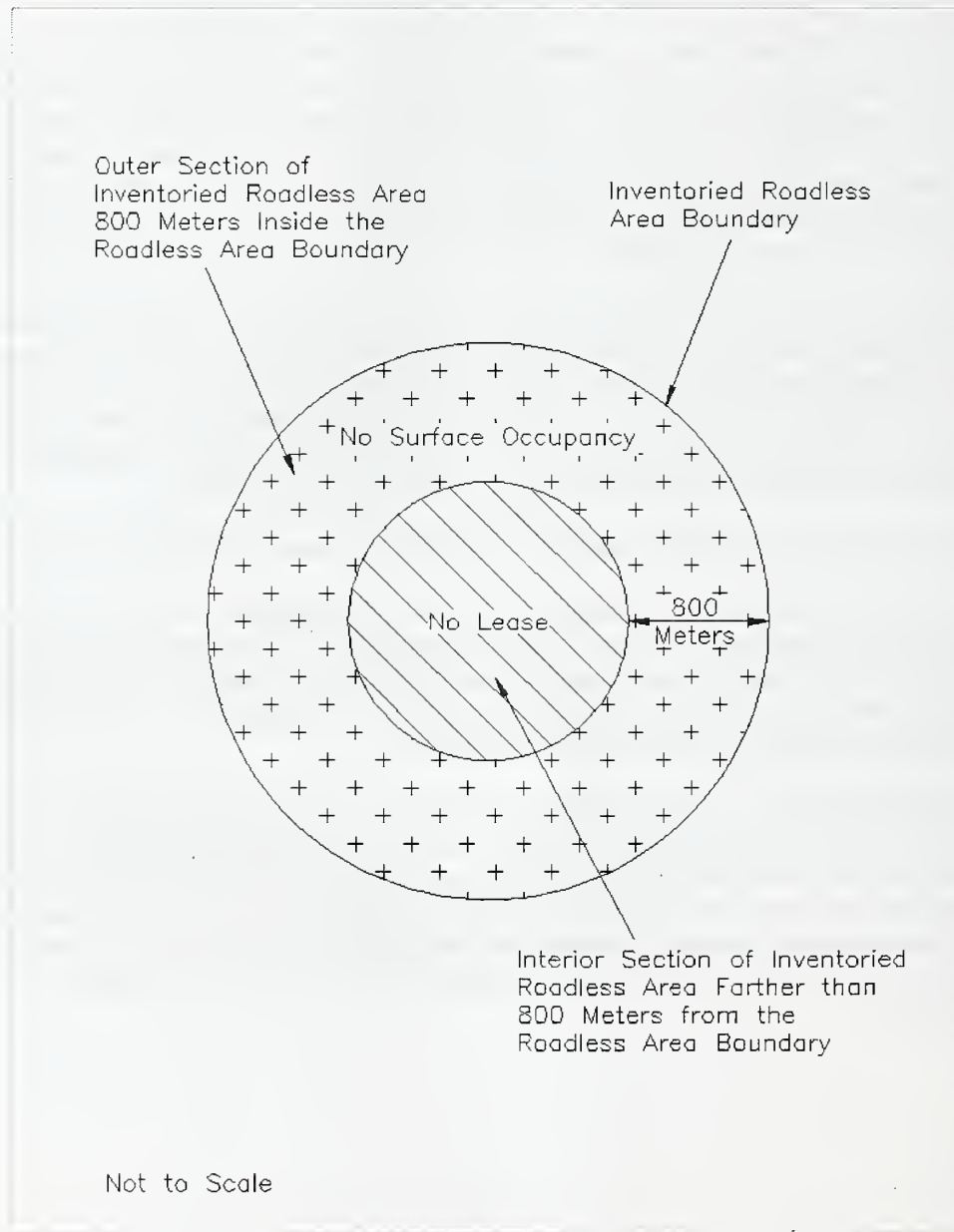


Table 2-1: Standard Lease Terms and Lease Stipulations for Alternative 2

WILDLIFE		
Greater Sage-Grouse		
	Leks	
	Stipulation / Lease Restriction	No Surface Occupancy 3 kilometer radius buffer around leks
	Objective	To protect all leks
	Waiver	None
	Exception	None
	Modification	A modification of the Stipulation/Lease Restriction may be granted if field studies show that a lek is not active (has not been used in the last 5 years)
	Nesting / Early Brood Rearing Habitat	
	Stipulation / Lease Restriction	Timing Limit: 03/15–07/15
	Objective	To protect occupied or potential habitat for nesting and early brood-rearing
	Waiver	None
	Exception	None
	Modification	A modification of the Stipulation/Lease Restriction may be granted if new habitat studies or surveys show that a portion of the area does not contain nesting/early brood-rearing habitat or the habitat is not occupied
	Summer Habitat	
	Stipulation / Lease Restriction	Controlled Surface Use
	Objective	To protect occupied or potential summer habitat
	Waiver	None
	Exception	None
	Modification	A modification of the Stipulation/Lease Restriction may be granted if new habitat studies or surveys show that a portion of the area does not contain summer habitat or the habitat is not occupied
	Raptors	
	Nesting Buffers	
	Stipulation / Lease Restriction	No Surface Occupancy 800 m radius around nests
	Objective	To preclude new surface-disturbing activities around raptor nests
	Waiver	None
	Exception	None
	Modification	None

Pygmy Rabbit		
	Burrow sites	
	Stipulation / Lease Restriction	No Surface Occupancy
	Objective	To preclude new surface-disturbing activities in areas where pygmy rabbits occur
	Waiver	None
	Exception	None
	Modification	None
Elk		
	Winter Range	
	Stipulation / Lease Restriction	Timing Limit: 12/1–4/1
	Objective	To preclude new surface-disturbing activities within elk winter range which would cause increased stress and/or displacement of animals during the critical time period identified above
	Waiver	None
	Exception	An exception may be granted if seasonal conditions (i.e., an early spring and snow melt) have caused elk to leave the general area
	Modification	A modification of the Stipulation/Lease Restriction may be granted if field studies or surveys show that a specific area is not suitable range
	Calving	
	Stipulation / Lease Restriction	Timing Limit: 5/1 to 6/30 800 meter buffer around perennial streams
	Objective	To preclude new surface-disturbing activities within elk calving areas which would cause increased stress and/or displacement of animals during calving
	Waiver	None
	Exception	None
	Modification	None
Bighorn Sheep		
	Stipulation / Lease Restriction	No Surface Occupancy
	Objective	To prevent disturbance to bighorn sheep range that could cause increased stress and displacement of animals
	Waiver	None
	Exception	None
	Modification	A modification of the stipulation may be granted if field studies show that a specific area is not suitable range

Mule Deer		
	Winter Range	
	Stipulation / Lease Restriction	Timing Limit: 12/1 to 4/1
	Objective	To preclude new surface disturbance within mule deer winter range, which could cause increased stress and displacement of animals
	Waiver	None
	Exception	An exception may be granted (i.e., an early spring and snow melt) if seasonal conditions are such that the deer have moved out of the general area
	Modification	A modification of the Stipulation/Lease Restriction may be granted if field studies or surveys show that a specific area is not suitable range
Neo-Tropical Migratory Birds		
	Nesting	
	Stipulation / Lease Restriction	Timing Limit: 5/1 to 7/31
	Objective	For the protection of breeding migratory birds
	Waiver	None
	Exception	If field surveys do not find nesting birds the Timing Limitation would not apply
	Modification	None
VEGETATION COMMUNITIES		
Mountain Mahogany		
	Stipulation / Lease Restriction	No Surface Occupancy
	Objective	To preclude construction within big game forage and winter range
	Waiver	None
	Exception	None
	Modification	A modification to the Stipulation/Lease Restriction may be granted if onsite studies indicate that no mountain mahogany is present
Riparian		
	Aspen	
	Stipulation/Lease Restriction	No Surface Occupancy
	Objective	To preclude construction activities within areas where biodiversity is particularly high
	Waiver	None
	Exception	None
	Modification	A modification to the Stipulation/Lease Restriction may be granted if onsite studies indicate that no aspen are present

Great Basin Sub-Alpine (except bristlecone pine)		
	All (EXCEPT Bristlecone Pine)	
	Stipulation/Lease Restriction	No Surface Occupancy
	Objective	To preclude construction of well sites and facilities within this limited plant community
	Waiver	None
	Exception	None
	Modification	A modification to the stipulation may be granted if onsite studies indicate that impacts would not lead to a substantial loss of the habitat
	Bristlecone Pine	
	Stipulation/Lease Restriction	No Surface Occupancy
	Objective	To preclude construction of well sites and facilities in bristlecone pine stands
	Waiver	None
	Exception	None
	Modification	If site-specific inventory shows that bristlecone pine stands do not exist within the project area, the SLT would then apply
Rare Plants		
	Region 4 Sensitive Plants (Occupied Habitat)	
	Stipulation/Lease Restriction	No Surface Occupancy
	Objective	To preclude disturbance to sensitive plant species
	Waiver	None
	Exception	None
	Modification	None
	Threatened & Endangered Species	
	Stipulation/Lease Restriction	Standard Lease Terms
	Objective	To protect any future TES. This includes full protection under the ESA
	Waiver	None
	Exception	None
	Modification	None
	Nevada Listed Species	
	Stipulation/Lease Restriction	No Surface Occupancy
	Objective	To preclude disturbance to Nevada-listed species
	Waiver	None
	Exception	None
	Modification	None

WATER QUALITY**Riparian Buffers****All streams (+100-yr flood plain, springs, ponds, and riparian)**

	Stipulation / Lease Restriction	No Surface Occupancy
		30 m buffer on perennial streams, springs, ponds, and wet meadows
		15 m buffer on seasonal or subsurface streams
	Objective	To preclude new surface-disturbing activities within critical riparian and aquatic habitats and 100-year flood plains
	Waiver	None
	Exception	Road crossings may be permitted if no other alternative for placement of the transportation corridor exists
	Modification	A modification may be granted for construction of well sites and facilities if an onsite inspection demonstrates that aquatic and riparian habitat do not exist on the specific site and/or activities will not occur within the 100-year flood plain for all streams types, including ephemeral and subsurface flow

SOILS AND GEOLOGY**Erosion Hazard**

	Stipulation/Lease Restriction	Standard Lease Terms: slopes < 10% and 10–25%
		No Surface Occupancy: slopes > 25%
	Objective	To preclude construction of wells sites and related facilities on slopes over 25%, which would involve relative risk of mass failure or high erosion hazard on large cut and fill slopes, and would be difficult to rehabilitate
	Waiver	None
	Exception	None
	Modification	A modification to NSO Stipulation/Lease Restriction may be granted if onsite review of a proposed well site or facility shows that conditions favorable for construction exists on slopes greater than 25%

OTHER		
Roadless Areas		
	Within 800 meters of boundary	
	Stipulation/Lease Restrictions	No Surface Occupancy
	Objective	To protect roadless character of the area
	Waiver	A waiver may be granted if upon future review during the forest planning process the area is determined to not possess roadless attributes or character
	Exception	None
	Modification	None
	> 800 meters from boundary	
	Stipulation/Lease Restrictions	No Lease
	Objective	To protect roadless character of the area
	Waiver	A waiver may be granted if upon future review during the forest planning process the area is determined to not possess roadless attributes or character
	Exception	None
	Modification	None
Recreation Opportunity Spectrum (ROS)		
	Stipulation/Lease Restrictions	No Surface Occupancy: Primitive
		Controlled Surface Use: Semi-Primitive Non- Motorized
		Standard Lease Terms: Road Natural/Semi-Primitive Motorized
	Objective	NSO: To preclude surface occupancy and new surface-disturbing activities within a primitive setting
		CSU: To minimize the effects of activities within semi-primitive non-motorized areas by requiring that activities be located, designed, and reclaimed in a manner that would minimize effects to the semi-primitive non-motorized character of the land, or result in a change in classification
		SLT: Roaded natural/semi-primitive motorized
	Waiver	None
	Exception	None
	Modification	None
Visual Quality Objectives (VQOs)		
	Stipulation / Lease Restriction	No Surface Occupancy: Retention
		Controlled Surface Use: Partial Retention
		Standard Lease Terms: Modification, Max. Modification
	Objective	NSO: To protect the high quality scenic resources present on Forest lands within the study area
		CSU: To protect the scenic quality of forest lands within the study area by requiring proposed activities to be located and designed to meet the partial retention objectives within 1 year from project completion
	Waiver	None
	Exception	None
	Modification	None

Administrative & Recreation Sites		
	Stipulation/Lease Restrictions	No Surface Occupancy
	Objective	Forest Plan precludes construction on lands identified as Forest Service Administrative sites
	Waiver	None
	Exception	None
	Modification	None
Heritage Resource Properties		
	Stipulation/Lease Restrictions	Standard Lease Terms
	Objective	To preclude damage to sensitive heritage resource properties identified within the planning area; this provides protection under all applicable heritage and cultural resource laws
	Waiver	None
	Exception	None
	Modification	None

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Figure 2-4: White Pine Division – Alternative 2: Forest Plan with Maximum Protection

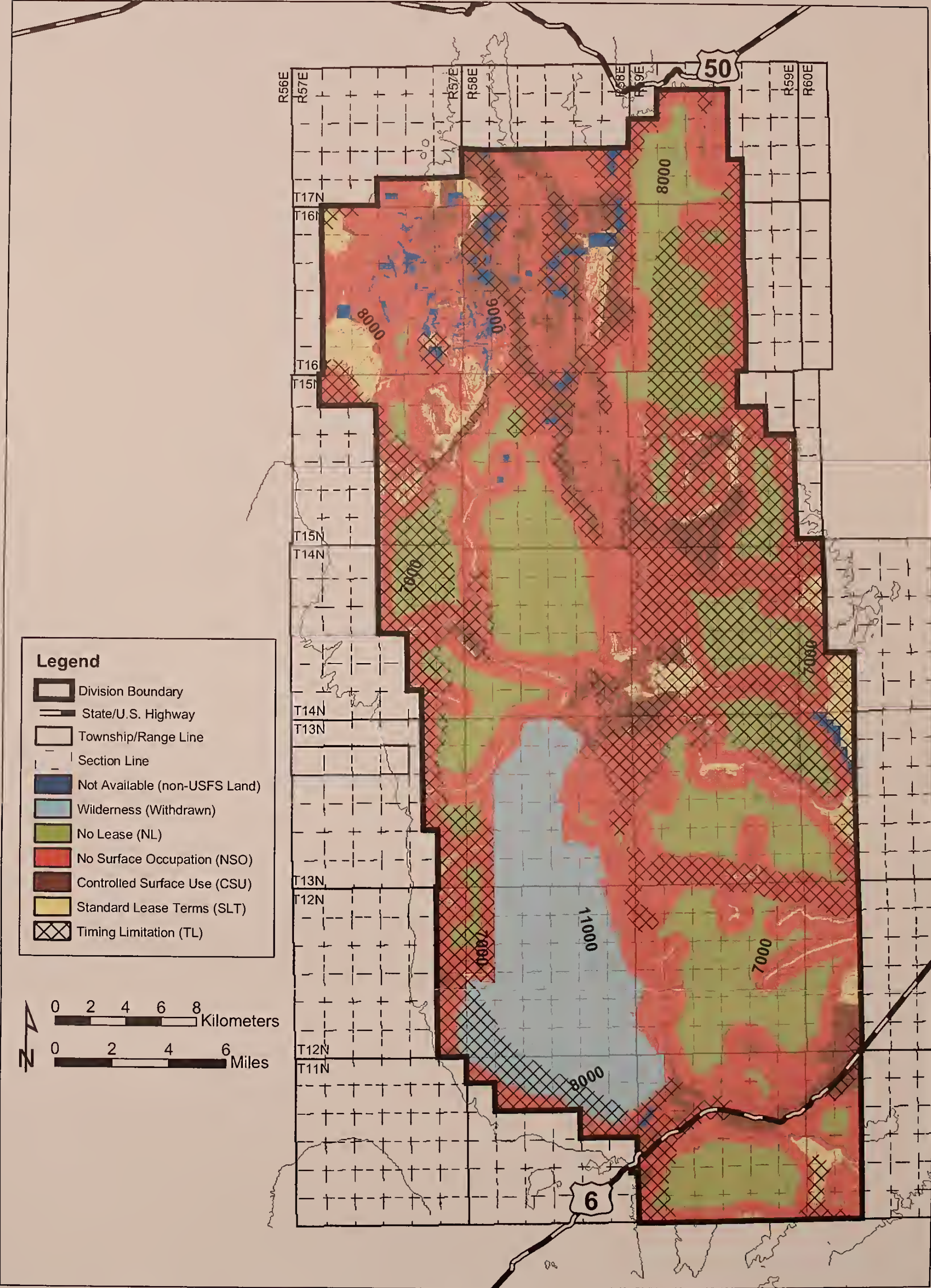
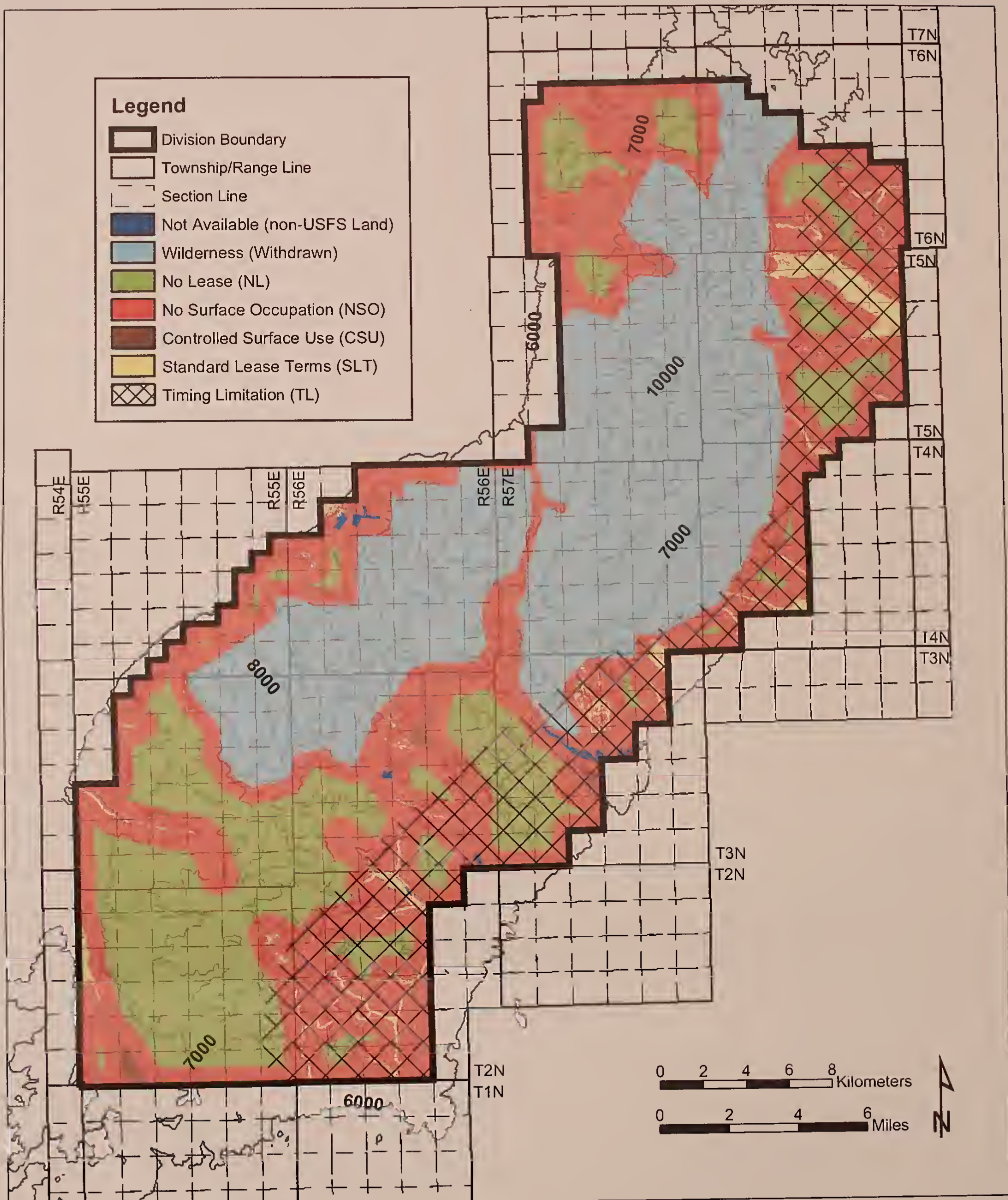


Figure 2-5: Grant-Quinn Division – Alternative 2: Forest Plan with Maximum Protection



6.3. Alternative 3 (Forest Plan with Moderate Resource Protection)

This alternative has fewer constraints than Alternative 2, but still provides greater resource protection than the Forest Plan Alternative. Adjustments in stipulations take several forms and occur for nearly all resource concerns. The different resources associated with major leasing restrictions, the type of stipulation (Table 2-2), and the approximate acreage for the restriction are summarized in Table 2-4.

Three IRAs (see Figures 2-6 and 2-7) with primitive characteristics would be protected. The protections would include a NSO restriction for areas 800 meters (2,625 feet) inside the roadless area boundary, and a no-lease stipulation for interior areas farther than 800 meters (2,625 feet) from the roadless area boundaries (see Figure 2-3). The remaining roadless areas would have a controlled-surface-use stipulation.

Under this alternative, all of the NF System lands within the analysis area would be administratively available for leasing; except the Currant Mountain, Grant Range, and Quinn Canyon Wildernesses; new wilderness designated under the *White Pine County Lands Bill*; and portions of IRAs as described above (see Figures 2-8 and 2-9). Lands available for leasing would have various levels of protection: NSO, Controlled Surface Use, Controlled Surface Use with Timing Limitation, standard lease terms, and standard lease terms with Timing Limitations (see Tables 2-5 and 2-6).

Lands available for leasing under this alternative total 389,428 acres (see Tables 2-5 and 2-6). Lease restrictions were reduced from those in Alternative 2 as shown in Table 2-2a.

Table 2-2a: Changes in lease restrictions from Alternative 2 to Alternative 3

Resource/Concern	Alternative 2 (from)	Alternative 3 (to)
Raptor nest buffers	No Surface Occupancy	Controlled Surface Use
Pygmy rabbits	No Surface Occupancy	Standard Lease Terms
Elk winter range	Timing Limitations	Controlled Surface Use
Elk calving habitat	Timing Limitations	Standard Lease Terms
Bighorn sheep winter range	No Surface Occupancy	Controlled Surface Use
Mule deer winter range	Timing Limitations	Controlled Surface Use
Neotropical migratory birds	Timing Limitations	Standard Lease Terms
Mountain mahogany	No Surface Occupancy	Controlled Surface Use
Aspen	No Surface Occupancy	Controlled Surface Use
Great Basin Sub-Alpine (except Bristlecone)	No Surface Occupancy	Controlled Surface Use
Nevada state listed species	No Surface Occupancy	Standard Lease Terms
Erosion hazard 25–40% slopes	No Surface Occupancy	Controlled Surface Use
Roadless areas within 800 m (2,625 ft) of boundary	No Surface Occupancy ¹	No Surface Occupancy ² / Controlled Surface Use ³
Roadless areas more than 800 m from boundary	No Lease ¹	No Lease ² / Controlled Surface Use ³

¹ Applies to all roadless areas as shown on Figures 3-18 and 3-19.

² Applies to three roadless areas as shown on Figures 2-6 and 2-7 described in Chapter 4, section 4.1.3.

³ Applies to remaining roadless areas not shown on Figures 2-6 and 2-7.

Table 2-2b: Standard Lease Terms and Lease Stipulations for Alternative 3

WILDLIFE		
Greater Sage-Grouse		
Leks		
	Stipulation / Lease Restriction	No Surface Occupancy: 3 km radius buffer around leks
	Objective	To preclude disturbance to all leks
	Waiver	None
	Exception	None
	Modification	A modification of the Stipulation/Lease Restriction may be granted if field studies show that a lek is not active (has not been used in the last 5 years)
Nesting / Early Brood Rearing Habitat		
	Stipulation / Lease Restriction	Timing Limit: 3/15–7/15
	Objective	To protect occupied or potential habitat for nesting and early brood-rearing
	Waiver	None
	Exception	None
	Modification	A modification of the Stipulation/Lease Restriction may be granted if new habitat studies or surveys show that a portion of the area does not contain nesting/early brood rearing habitat or the habitat is not occupied
Summer Habitat		
	Stipulation / Lease Restriction	Controlled Surface Use
	Objective	To protect occupied or potential summer habitat
	Waiver	None
	Exception	None
	Modification	A modification of the stipulation may be granted if new habitat studies or surveys show that a portion of the area does not contain summer habitat or the habitat is not occupied
Raptors		
Nesting Buffers		
	Stipulation / Lease Restriction	Controlled Surface Use
	Objective	Minimal oil and gas activity within 800 m of active raptor nests
	Waiver	None
	Exception	Oil and gas activity can occur during periods when the nests are not occupied If oil and gas activity is occurring and ongoing and nest becomes occupied, then oil and gas activity may continue
	Modification	Depending on species and their sensitivity to activity, controlled surface use may be precluded

Pygmy Rabbit		
	Burrow sites	
	Stipulation / Lease Restriction	Standard Lease Terms
	Objective	Provides minimal protection from new surface-disturbing activities in areas where pygmy rabbits occur
	Waiver	None
	Exception	None
	Modification	None
Elk		
	Winter Range	
	Stipulation / Lease Restriction	Controlled Surface Use
	Objective	To limit new surface-disturbing activities within elk winter range by designing facilities and developments to minimize loss of habitat
	Waiver	None
	Exception	An exception may be granted if it can be demonstrated that reclamation will improve habitat in the long term; the SLT would then apply
	Modification	A modification of the Stipulation/Lease Restriction may be granted if onsite study shows no elk winter range in the Project Area; the SLT would then apply
	Calving	
	Stipulation / Lease Restriction	Standard Lease Terms
	Objective	Minimize impacts to elk and calving habitat
	Waiver	None
	Exception	None
	Modification	None
	Bighorn Sheep	
	Stipulation / Lease Restriction	Controlled Surface Use
	Objective	To limit new surface-disturbing activities within bighorn sheep range by designing facilities and developments to minimize loss of habitat and disturbance of bighorn sheep
	Waiver	None
	Exception	An exception may be granted if reclamation will improve habitat in the long range; the SLT would then apply
	Modification	A modification of the Stipulation/Lease Restriction may be granted if site-specific inventory shows no critical bighorn sheep range in the Project Area; the SLT would then apply

Mule Deer		
	Winter Range	
	Stipulation / Lease Restriction	Controlled Surface Use
	Objective	To limit new surface-disturbing activities within mule deer winter range by designing facilities and developments to minimize loss of habitat and disturbance to mule deer
	Waiver	None
	Exception	An exception may be granted if reclamation will improve habitat in the long range; the SLT would then apply
	Modification	A modification of the Stipulation/Lease Restriction may be granted if site-specific inventory shows no mule deer winter range in the Project Area ; the SLT would then apply
Neo-Tropical Migratory Birds		
	Nesting	
	Stipulation / Lease Restriction	Standard Lease Terms
	Objective	Minimize disturbance to nesting neotropical migratory birds
	Waiver	None
	Exception	None
	Modification	None
VEGETATION COMMUNITIES		
Mountain Mahogany		
	Stipulation / Lease Restriction	Controlled Surface Use
	Objective	To limit construction within mountain mahogany, where it serves as wildlife forage and winter range, by designing facilities and developments to minimize habitat loss
	Waiver	None
	Exception	An exception may be granted if reclamation will improve habitat in the long term; the SLT would then apply
	Modification	A modification of the Stipulation/Lease Restriction may be granted if site-specific inventory shows no wildlife forage or winter range does in the Project Area; the SLT would then apply
Riparian		
	Aspen	
	Stipulation/Lease Restriction	Controlled Surface Use
	Objective	To limit construction activities within aspen stands by designing facilities and developments to minimize habitat loss
	Waiver	None
	Exception	None
	Modification	If site-specific inventory shows no aspen stands in the Project Area, the SLT would then apply
Great Basin Sub-Alpine (except bristlecone pine)		

All EXCEPT Bristlecone Pine		
	Stipulation/Lease Restriction	Controlled Surface Use
	Objective	To limit construction of well sites and facilities within this limited plant community
	Waiver	None
	Exception	None
	Modification	If site-specific inventory shows no Great Basin subalpine stands in the Project Area, the SLT would then apply
Bristlecone Pine		
	Stipulation/Lease Restriction	No Surface Occupancy
	Objective	To preclude construction within bristlecone pine stands
	Waiver	None
	Exception	None
	Modification	If site-specific inventory shows no bristlecone pine stands in the Project Area, the SLT would then apply
Rare Plants		
R4 Sensitive Plants (Occupied Habitat)		
	Stipulation/Lease Restriction	No Surface Occupancy
	Objective	To protect sensitive plant species.
	Waiver	None
	Exception	None
	Modification	A modification to the stipulation may be granted if onsite studies indicate that impacts would not lead to a substantial loss of the habitat
Threatened & Endangered Species		
	Stipulation/Lease Restriction	Standard Lease Terms
	Objective	To protect any future TES locations; includes full protection under the ESA
	Waiver	None
	Exception	None
	Modification	None
Nevada Listed Species		
	Stipulation/Lease Restriction	Standard Lease Terms
	Objective	To protect Nevada-listed plant species; includes full protection under the Nevada Revised Statutes
	Waiver	None
	Exception	None
	Modification	None

WATER QUALITY		
Riparian Buffers		
All streams (including + 100-yr flood plain, springs, ponds, and riparian)		
	Stipulation/Lease Restriction	No Surface Occupancy
		30 m buffer on perennial streams, springs, ponds, and wet meadows
		15 m buffer on seasonal or subsurface streams
	Objective	To preclude new surface-disturbing activities within critical riparian and aquatic habitats, and 100-yr flood plains
	Waiver	None
	Exception	Road crossings may be permitted if there is no other alternative for placement of the transportation corridor
	Modification	A modification may be granted for construction of well sites and facilities if an onsite inspection shows no aquatic and riparian habitat and/or activities will not occur within the 100-year flood plain for all streams types, including ephemeral and subsurface flow
SOILS AND GEOLOGY		
Erosion Hazard		
	Stipulation/Lease Restriction	Standard Lease Terms: slopes less than 10% and 10–25%
		Controlled Surface Use: slopes 25–40%
		No Surface Occupancy: slopes greater than 40%
	Objective	To preclude construction of wells sites and related facilities on slopes over 40%, which would involve relative risk of failure for large cut and fill slopes, and which would be difficult to rehabilitate; the objective for the CSU Stipulation/Lease Restriction requires facilities such as well sites to be located to minimize construction on slopes and or designed to minimize large cut and fill slopes that would be difficult to rehabilitate
	Waiver	None
	Exception	None
	Modification	A modification to NSO Stipulation/Lease Restriction may be granted if an onsite review of a proposed well site or facility shows that conditions for construction on slopes greater than 40%

OTHER		
Roadless Areas		
	Within 800 meters of boundary	
	Stipulation/Lease Restrictions	No Surface Occupancy: for three selected roadless areas
		Controlled Surface Use: for remainder of roadless areas
	Objective	NSO: Preclude activities in key roadless areas that have primitive characteristics, few cherry-stem roads, are >5,000 acres, and are manageable
		CSU: Operations will be managed to minimize impacts to roadless character
	Waiver	A waiver may be granted if upon future review during the forest planning process the area is determined to not possess roadless attributes or character
	Exception	None
	Modification	None
	> 800 meters from boundary	
	Stipulation/Lease Restrictions	No Lease: for three selected roadless areas
		Controlled Surface Use: for remaining roadless areas
	Objective	For No Lease: Preclude activities in key roadless areas that have primitive characteristics, few cherry-stem roads, are >5,000 acres, and are manageable
		For CSU: Operations will be managed to minimize impacts roadless character
Waiver	A waiver may be granted if upon future review during the forest planning process the area is determined to not possess roadless attributes or character	
Exception	None	
Modification	None	
Recreation Opportunity Spectrum		
	Stipulation/Lease Restrictions	No Surface Occupancy: Primitive
		Controlled Surface Use: Semi-Primitive Non-Motorized
		Standard Lease Term: Road Natural/Semi-Primitive Motorized
	Objective	NSO: To preclude surface occupancy and new surface-disturbing activities within a primitive setting
		CSU: To limit the effect of disturbance by requiring that activities be located, designed, and reclaimed in a manner that would maintain the semi-primitive non-motorized character of the land
	Waiver	None
	Exception	None
Modification	Allow limited development that would have a minor effect to the primitive setting after site-specific review	

Visual Quality Objectives (VQOs)		
	Stipulation / Lease Restriction	No Surface Occupancy: Retention
		Controlled Surface Use: Partial Retention
		Standard Lease Terms: Modification and Max. Modification
	Objective	NSO: To protect the high quality scenic resources present on Forest lands within the study area
		CSU: To protect the scenic quality of forest lands within the study area by requiring proposed activities to be located and designed to meet the partial retention objectives within 3 years from project completion
	Waiver	None
	Exception	None
	Modification	Allow limited development that would have a minor effect to high quality scenic resources after site-specific review
Administrative & Recreation Sites		
	Stipulation/Lease Restrictions	No Surface Occupancy
	Objective	Preclude development within administrative and recreation sites
	Waiver	None
	Exception	None
	Modification	None
Heritage Resource Properties		
	Stipulation/Lease Restrictions	Standard Lease Terms
	Objective	To preclude damage to sensitive heritage resource properties identified within the planning area; this provides protection under all applicable heritage and cultural resource laws
	Waiver	None
	Exception	None
	Modification	None

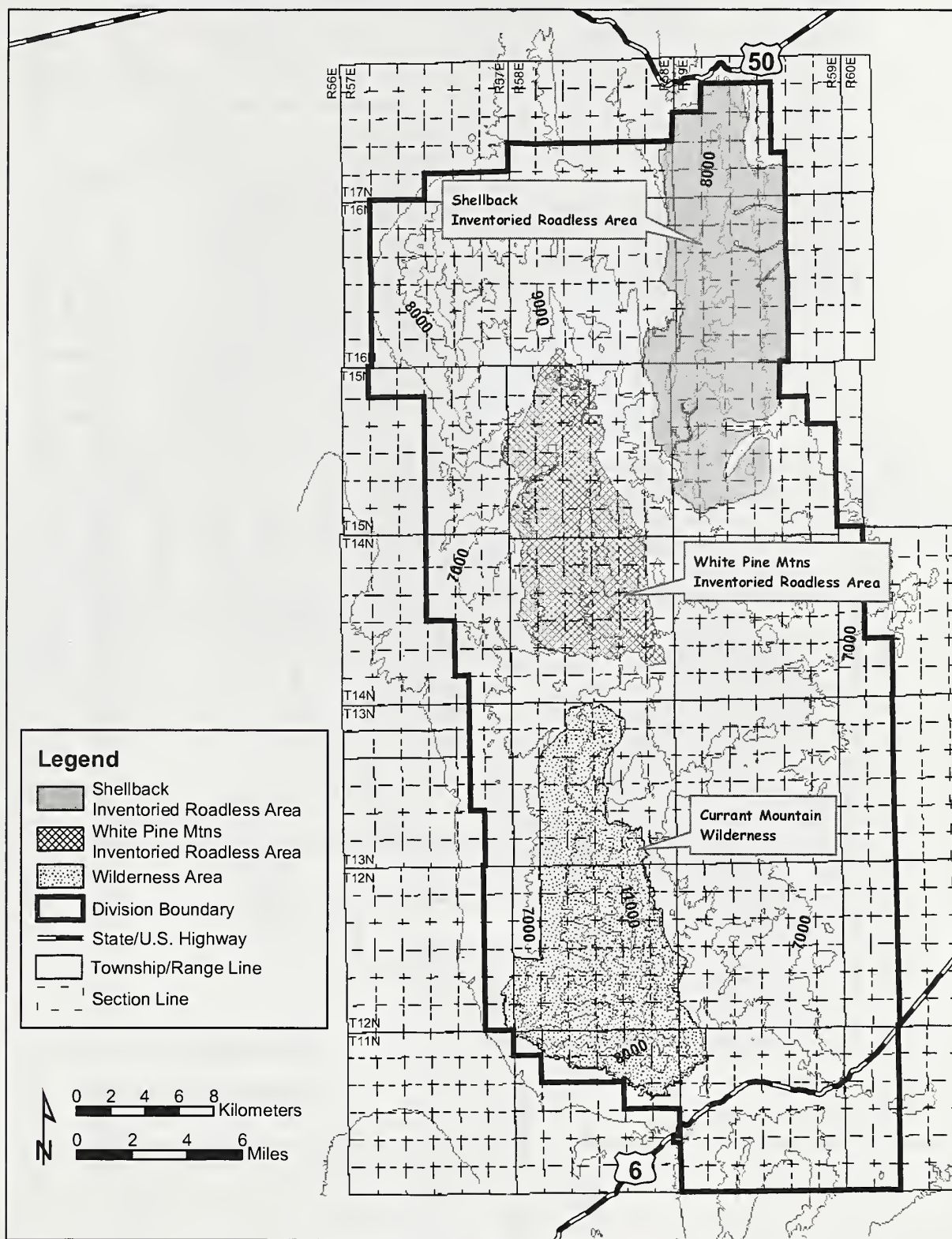
Figure 2-6: White Pine Division – Alternative 3 Selected Roadless Areas

Figure 2-7: Grant-Quinn Division – Alternative 3 Selected Roadless Areas

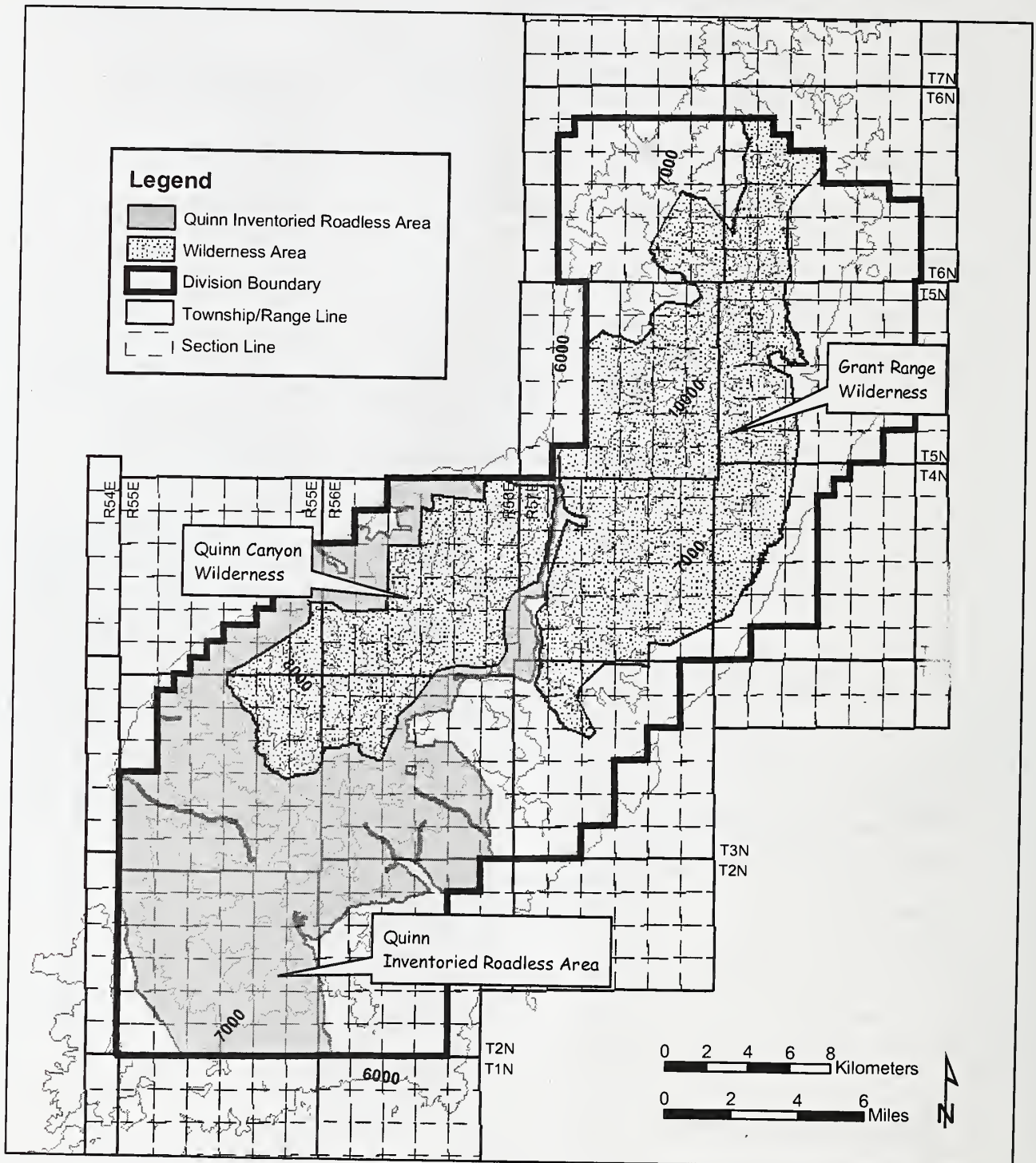


Figure 2-8: White Pine Division – Alternative 3: Forest Plan with Moderate Resource Protection

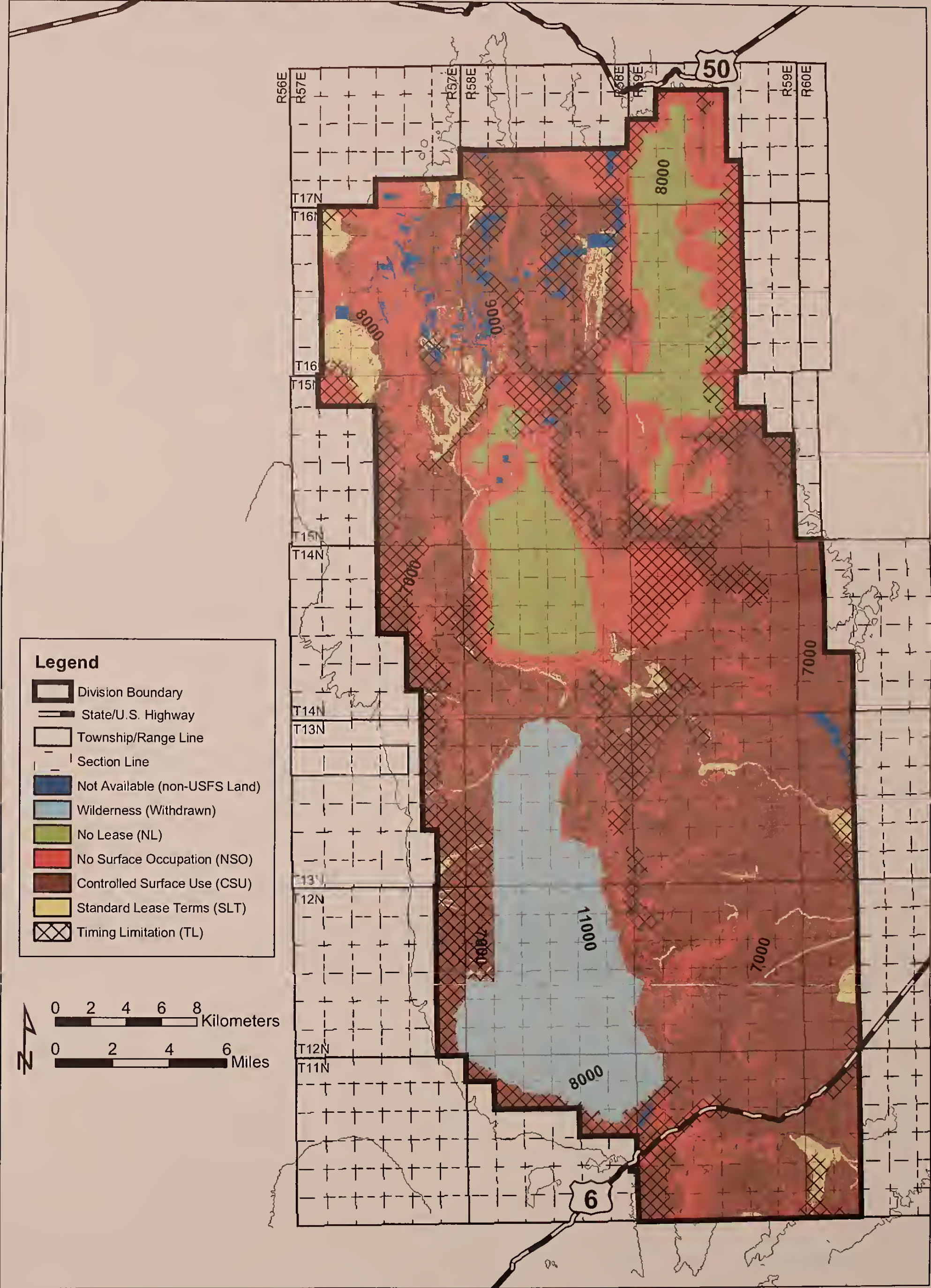
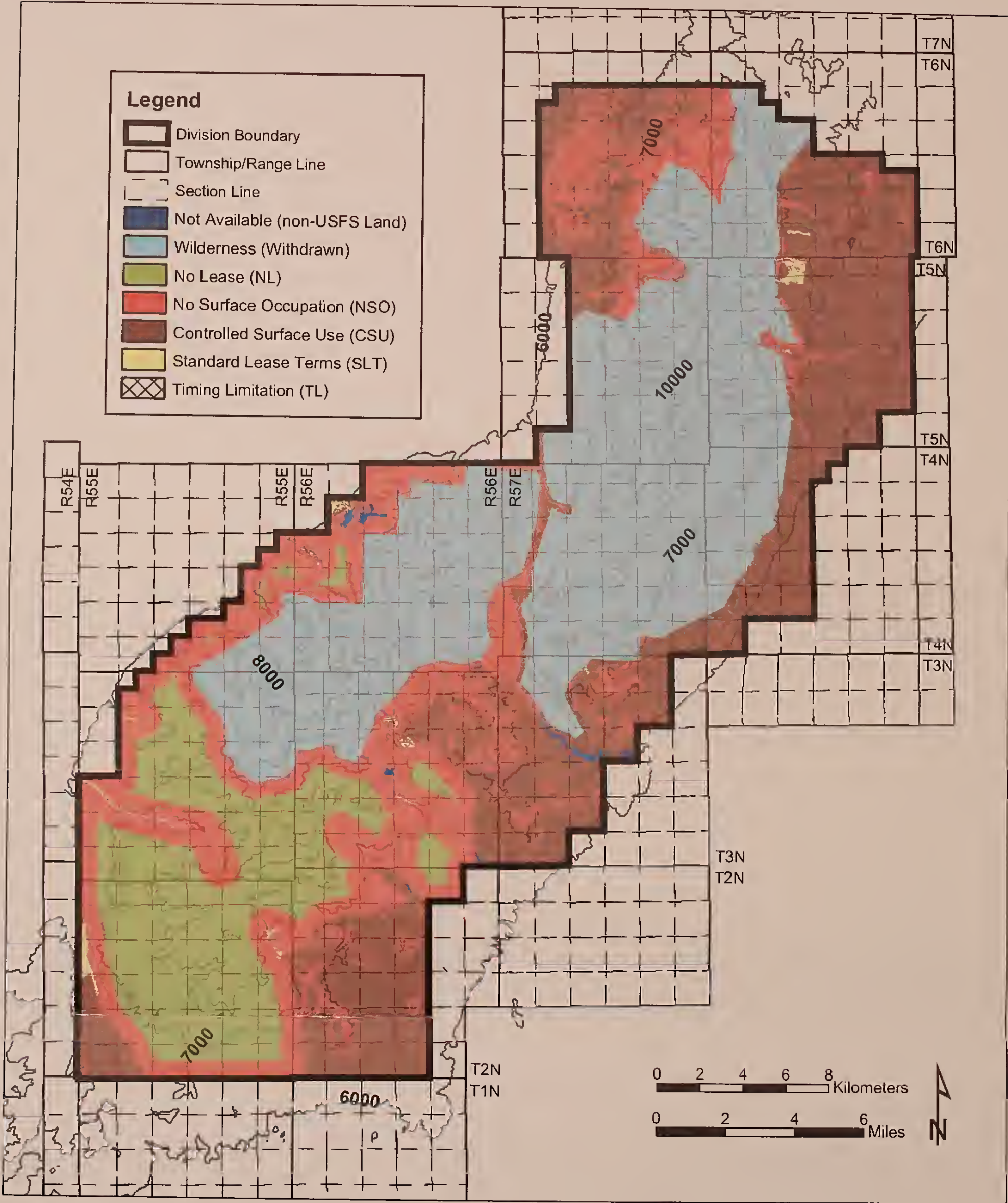


Figure 2-9: Grant-Quinn Division – Alternative 3: Forest Plan with Moderate Resource Protection



6.4. Alternative 4 (Forest Plan, Proposed Action)

This alternative follows management direction as provided in the Forest Plan and, for some resources, defines the least restrictive of the possible range of alternatives.

Under this alternative, all of the Forest System lands within the analysis area would be administratively available for leasing; except the Currant Mountain, Grant Range, and Quinn Canyon Wildernesses; and new wilderness designated under the *White Pine County Lands Bill* (see Figures 2-10 and 2-11).

Available lands would be leased with SLTs and special stipulations to protect resources as allowed in the Forest Plan Appendix H - Special Stipulations for Forest Service Mineral Leases (see Appendix H of this document). The different resources associated with major leasing restrictions, the type of stipulation (Table 2-3), and the approximate acreage for the restriction are summarized below in Table 2-4. Lands available for leasing would have various levels of protection: NSO, Controlled Surface Use, Controlled Surface Use with Timing Limitation, standard lease terms, and standard lease terms with Timing Limitations (see Tables 2-5 and 2-6). Lands available for leasing under this alternative total 449,132 acres (see Tables 2-5 and 2-6).

Table 2-3a: Changes in lease restrictions from Alternative 2 to Alternative 4

Resource/Concern	Alternative 2 (from)	Alternative 4 (to)
Raptor nest buffers	No Surface Occupancy	Standard Lease Terms
Pygmy rabbits	No Surface Occupancy	Standard Lease Terms
Elk winter range	Timing Limitations	Standard Lease Terms
Elk calving habitat	Timing Limitations	Standard Lease Terms
Bighorn sheep winter range	No Surface Occupancy	Controlled Surface Use
Mule deer winter range	Timing Limitations	Standard Lease Terms
Neotropical migratory birds	Timing Limitations	Standard Lease Terms
Mountain mahogany	No Surface Occupancy	Standard Lease Terms
Aspen	No Surface Occupancy	Standard Lease Terms
Great Basin Sub-Alpine (except Bristlecone)	No Surface Occupancy	Controlled Surface Use
Forest Service sensitive plants	No Surface Occupancy	Standard Lease Terms
Nevada state listed species	No Surface Occupancy	Standard Lease Terms
Erosion hazard 25–40% slopes	No Surface Occupancy	Controlled Surface Use
Roadless areas within 800 m (2,625 ft) of boundary	No Surface Occupancy ¹	Standard Lease Terms ¹
Roadless areas more than 800 m from boundary	No Lease ¹	Standard Lease Terms ¹

¹ Applies to all roadless areas as shown in Figures 3-18 and 3-19.

Table 2-3b: Standard Lease Terms and Lease Stipulations for Alternative 4

WILDLIFE		
Greater Sage-Grouse		
	Leks	
	Stipulation / Lease Restriction	No Surface Occupancy: 3 km radius buffer around leks
	Objective	To protect all leks
	Waiver	None
	Exception	None
	Modification	A modification of the Stipulation/Lease Restriction may be granted if field studies show that a lek is not active (i.e., has not been used in the last 5 years)
	Nesting / Early Brood Rearing Habitat	
	Stipulation / Lease Restriction	Timing Limitation: 3/15–7/15
	Objective	To protect occupied or potential nesting and early brood-rearing habitat
	Waiver	None
	Exception	None
	Modification	A modification of the Stipulation/Lease Restriction may be granted if new habitat studies show that a portion of the area does not contain nesting/early brood-rearing habitat
	Summer Habitat	
	Stipulation / Lease Restriction	Controlled Surface Use
	Objective	To protect occupied or potential summer habitat
	Waiver	None
	Exception	None
	Modification	A modification of the Stipulation/Lease Restriction may be granted if new habitat studies or surveys show that a portion of the area does not contain summer habitat or the habitat is not occupied
	Raptors	
	Nesting Buffers	
	Stipulation / Lease Restriction	Standard Lease Terms
	Objective	Provide minimal protection for raptor nests
	Waiver	None
	Exception	None
	Modification	None

Pygmy Rabbit		
	Burrow sites	
	Stipulation / Lease Restriction	Standard Lease Terms
	Objective	To provide minimal protection where pygmy rabbits occur
	Waiver	None
	Exception	None
	Modification	None
Elk		
	Winter Range	
	Stipulation / Lease Restriction	Standard Lease Terms
	Objective	To provide minimal protection to elk winter range
	Waiver	None
	Exception	None
	Modification	None
	Calving	
	Stipulation / Lease Restriction	Standard Lease Terms
	Objective	To provide minimal impacts to elk and calving habitat
	Waiver	None
	Exception	None
	Modification	None
Bighorn Sheep		
	Stipulation / Lease Restriction	Controlled Surface Use
	Objective	To limit new surface-disturbing activities within bighorn sheep range by designing facilities and developments to minimize loss of habitat and disturbance
	Waiver	None
	Exception	An exception may be granted if reclamation will improve habitat in the long range; the SLT would then apply
	Modification	A modification of the Stipulation/Lease Restriction may be granted if site-specific inventory shows no critical bighorn sheep range in the Project Area; the SLT would then apply
Mule Deer		
	Winter Range	
	Stipulation / Lease Restriction	Standard Lease Terms
	Objective	To provide minimal protection to mule deer winter range
	Waiver	None
	Exception	None
	Modification	None

Neo-Tropical Migratory Birds			
	Nesting		
		Stipulation / Lease Restriction	Standard Lease Terms
		Objective	To provide minimal protection to nesting neotropical migratory birds
		Waiver	None
		Exception	None
		Modification	None
VEGETATION COMMUNITIES			
Mountain Mahogany			
		Stipulation / Lease Restriction	Standard Lease Terms
		Objective	To provide minimal protection to mountain mahogany cover type
		Waiver	None
		Exception	None
		Modification	None
Riparian			
	Aspen		
		Stipulation / Lease Restriction	Standard Lease Terms
		Objective	To provide minimal protection to aspen stands
		Waiver	None
		Exception	None
		Modification	None
Great Basin Sub-Alpine			
	All EXCEPT Bristlecone Pine		
		Stipulation / Lease Restriction	Controlled Surface Use
		Objective	To limit construction within locally rare and subalpine conifers by designing facilities to minimize loss
		Waiver	None
		Exception	None
		Modification	If site-specific inventory shows no Great Basin subalpine stands in the project area, the SLT would then apply
	Bristlecone Pine		
		Stipulation / Lease Restriction	No Surface Occupancy
		Objective	To preclude construction within bristlecone pine stands
		Waiver	None
		Exception	None
Modification		If site-specific inventory shows no bristlecone pine stands in the Project Area, the SLT would then apply	

Rare Plants		
Region 4 Sensitive Plants (Occupied Habitat)		
	Stipulation / Lease Restriction	Standard Lease Terms
	Objective	To protect sensitive plant species
	Waiver	None
	Exception	None
	Modification	None
	Threatened & Endangered Species	
	Stipulation / Lease Restriction	Standard Lease Terms
	Objective	To protect any future TES locations; includes full protection under the ESA
	Waiver	None
	Exception	None
	Modification	None
	Nevada Listed Species	
	Stipulation / Lease Restriction	Standard Lease Terms
	Objective	To protect Nevada-listed plant species; includes full protection under the Nevada Revised Statutes
	Waiver	None
	Exception	None
	Modification	None
WATER QUALITY		
Riparian Buffers		
All streams (including all streams, + 100-yr flood plain, springs, ponds, and riparian)		
	Stipulation / Lease Restriction	No Surface Occupancy
		30 m buffer on perennial streams, springs, ponds, and wet meadows
		15 m buffer on seasonal or subsurface streams
	Objective	To preclude new surface-disturbing activities within critical riparian and aquatic habitats, and 100-yr flood plains
	Waiver	None
	Exception	Road crossings may be permitted if there is no other alternative for placement of the transportation corridor
	Modification	A modification may be granted for construction of well sites and facilities if an onsite inspection shows no aquatic and riparian habitat and/or activities will not occur within the 100-year flood plain for all streams types, including ephemeral and subsurface flow

SOILS AND GEOLOGY		
Erosion Hazard		
	Stipulation / Lease Restriction	Standard Lease Terms: slopes less than 10% and 10–25%
		Controlled Surface Use: slopes 25–40% and > 40%
	Objective	CSU: To require that facilities such as well sites be located to minimize construction on slopes greater than 25% and designed to minimize large cut and fill slopes that would be difficult to rehabilitate
	Waiver	None
	Exception	None
	Modification	If onsite review of the proposed well site and facilities shows a slope < 25%, or that engineering design of the site can mitigate erosion and reclamation concerns on slopes > 25%, then modification may be granted
OTHER		
Roadless Areas		
	Within 800 meters of boundary	
	Stipulation / Lease Restriction	Standard Lease Terms
	Objective	Allow activities with minimal restrictions
	Waiver	None
	Exception	None
	Modification	None
	> 800 meters from boundary	
	Stipulation / Lease Restriction	Standard Lease Terms
	Objective	Allow activities with minimal restrictions
	Waiver	None
	Exception	None
	Modification	None
Recreation Opportunity Spectrum		
	Stipulation / Lease Restriction	No Surface Occupancy: Primitive
		Standard Lease Terms: Semi-Primitive Non-Motorized and Roaded Natural / Semi-Primitive Motorized
	Objective	NSO: To preclude surface occupancy and new surface disturbing activities within a primitive setting
		SLT: To allow activities with minimal restrictions
	Waiver	None
	Exception	None
	Modification	Allow limited development that would have a minor effect to the primitive setting after site-specific review

Visual Quality Objectives (VQOs)		
	Stipulation / Lease Restriction	No Surface Occupancy: Retention
		Controlled Surface Use: Partial Retention
		Standard Lease Terms: Modification and Max. Modification
	Objective	NSO: To protect the high quality scenic resources present on Forest lands within the study area
		CSU: To protect the scenic quality of forest lands within the study area by requiring proposed activities to be located and designed to meet the partial retention objectives within 3 years from project completion
	Waiver	None
	Exception	None
	Modification	Allow limited development that would have a minor effect to high quality scenic resources after site-specific review
Administrative & Recreation Sites		
	Stipulation / Lease Restriction	No Surface Occupancy
	Objective	Preclude development within administrative and recreation sites
	Waiver	None
	Exception	None
	Modification	None
Heritage Resource Properties		
	Stipulation / Lease Restriction	Standard Lease Terms
	Objective	To preclude damage to sensitive heritage resource properties identified within the planning area; this provides protection under all applicable heritage and cultural resource laws
	Waiver	None
	Exception	None
	Modification	None

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Figure 2-10: White Pine Division Alternative 4: Forest Plan (Proposed Action)

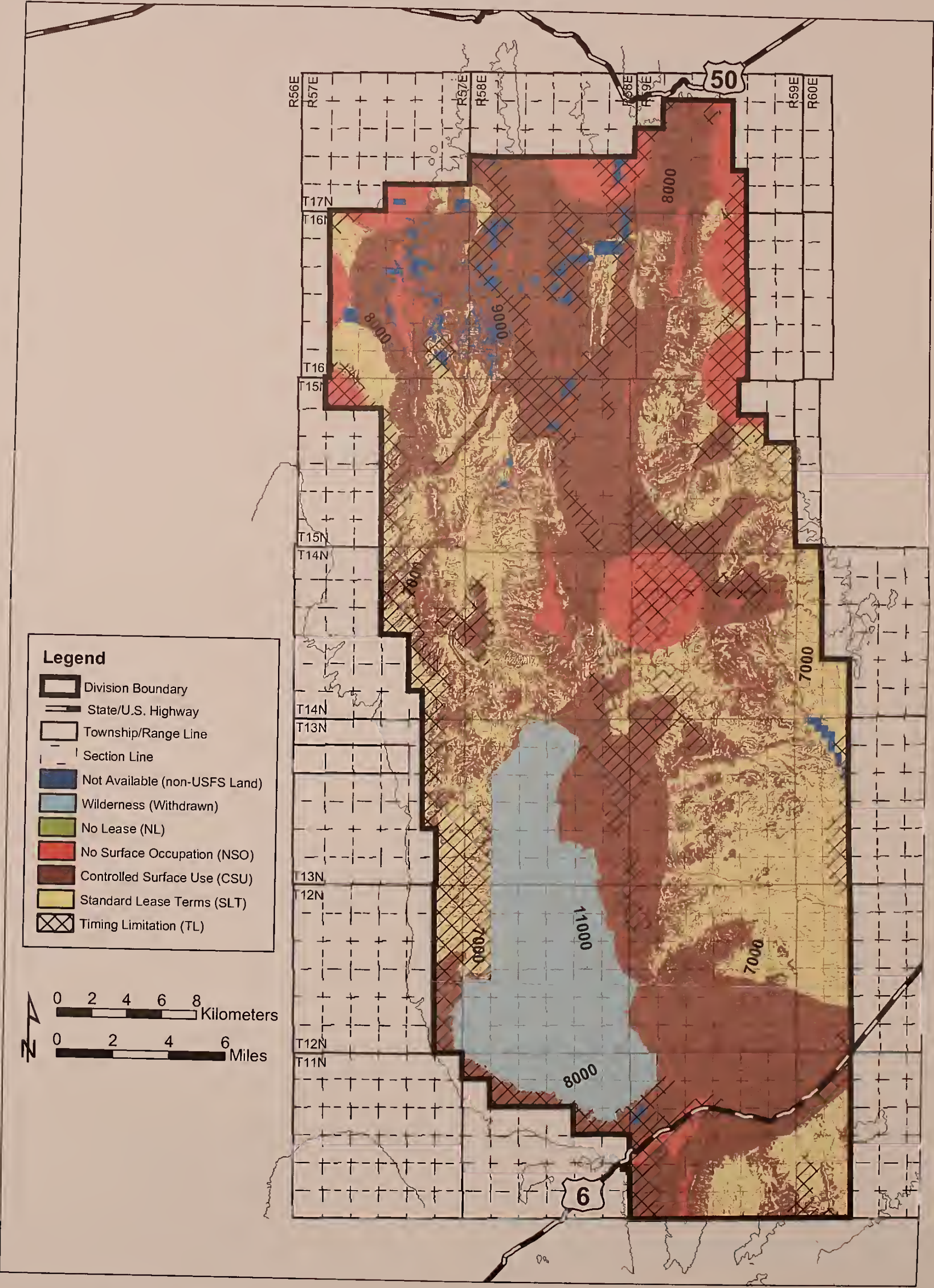
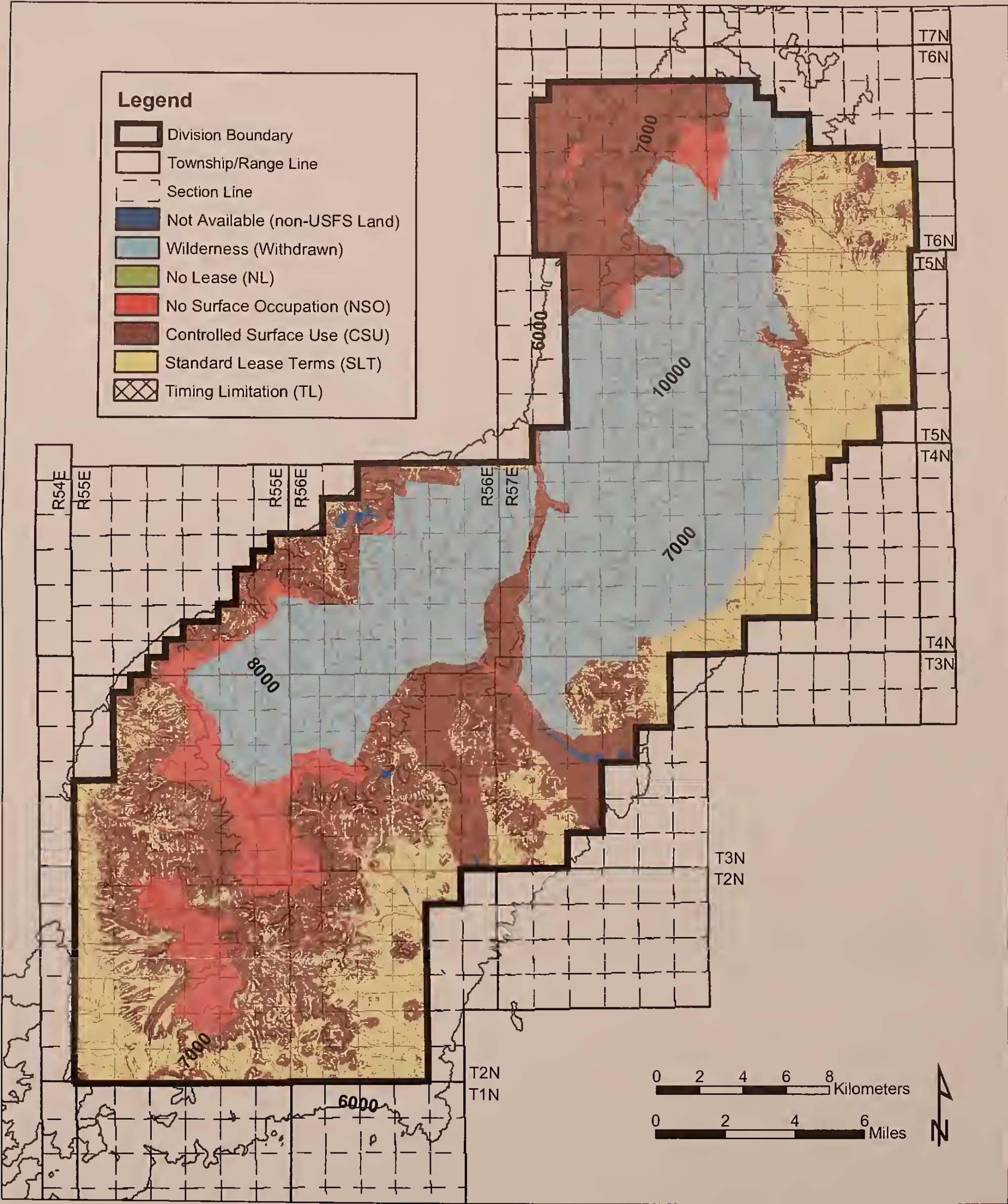


Figure 2-11: Grant-Quinn Division – Alternative 4: Forest Plan (Proposed Action)



6.5. Features Common To All Action Alternatives

Mitigation of impacts on other resources not addressed in Appendix H of Forest Plan (see Appendix H of this document) would be based on overall Forest Plan direction and existing laws and regulations. These include, but are not limited to, the *Endangered Species Act*, the *Archaeological Resource Protection Act*, the *Clean Water Act*, *Clean Air Act*, the Forest Plan and the *Forest Service Manual*.

For resources that are not protected by law, policy, or direction, mitigation would be based on the Standard Lease Terms and 43 CFR 3101.1-2, that provides clarification of reasonable mitigation as used in Section 6 of the Standard Lease Terms (delaying activities for up to 60 days or moving a well location up to 200 meters or 656 feet) and as provided for in 36 CFR 228.108.

7. ALTERNATIVES CONSIDERED BUT NOT EVALUATED IN DETAIL

The following alternatives were considered by the interdisciplinary team and dismissed after discussion or preliminary analysis.

7.1. Alternative 5 (No Surface Occupancy)

This alternative was developed to ensure that the option of leasing with NSO was considered for all specific resource areas and the analysis area as a whole. However, this alternative was not carried through the analysis when it became clear that it was not realistic or substantially different than the no-action alternative.

7.2. Alternative 6 (Standard Terms and Conditions)

Under this alternative, which was the least restrictive of the range of alternatives, all of the NF System land within the analysis area would be administratively available for leasing and would be leased with SLTs (no special stipulations). Mitigation of impacts on other resources would be based on existing laws such as the *Endangered Species Act*, the *Archaeological Resource Protection Act*, the *Clean Water Act*, *Clean Air Act*, Forest Plan, and *Forest Service Manual* direction. For resources that are not protected by law, or defined in the *Forest Plan*, mitigation would be based on the Standard Lease Terms and 43 CFR 3101.1-2. These provide clarification of reasonable mitigation as used in Section 6 of the Standard Lease Terms (delaying activities for up to 60 days or moving a well location up to 200 meters or 656 feet) and as provided for in 36 CFR 228.108.

After interdisciplinary team discussion and consultation with the regional mineral staff, this alternative was dropped because it was very similar to *Forest Plan* Alternative (Alternative 4). One of the Standard Lease Terms requires compliance with the *Forest Plan* and applicable law.

8. COMPARISON OF ALTERNATIVES

This section provides a comparison of alternatives in a table format. Table 2-4 lists sensitive resource components considered in the analysis, the leasing mitigation options for each alternative, and acres for each component. Tables 2-5 through 2-7 provide acres according to availability/restrictions for each alternative. The total acres available for leasing range from approximately 319,000 under Alternative 2 to 449,000 under Alternative 4. Acres of expected disturbance do not vary, however, for each action alternative as described in the Reasonably Foreseeable Development Scenario (Chapter 1, Section 8). This disturbance is projected at 394 total acres and is under 1 percent of the Project Area acres. This section portrays acreage figures prior to the adoption of the *White Pine County Lands Bill*.

9. PREFERRED ALTERNATIVE

The preferred alternative is Alternative 3.

10. ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferred alternative is Alternative 1.

Table 2-4: Comparison of Alternatives for White Pine and Grant-Quinn Oil and Gas Leasing EIS

Resource	Alternative 1 No Action / No Lease	Alternative 2 Forest Plan with Maximum Resource Protection	Alternative 3 Forest Plan with Moderate Resource Protection	Alternative 4 Forest Plan	Acres of Resources		
Wildlife					White Pine Division	Grant- Quinn Division	Total Acres
Greater Sage-Grouse							
Lek Buffers	NL	NSO	NSO	NSO	22,605	Not Present	22,605
Nesting & Early Brooding	NL	TL 3/15-7/15	TL 3/15-7/15	TL 3/15-7/15	82,880	Not Present	82,880
Summer Habitat		CSU	CSU	CSU	74,060	Not Present	74,060
Raptors							
Nest Buffers	NL	NSO	CSU	SLT	10,035	6,998	17,033
Pygmy Rabbit							
Burrow Sites	NL	NSO	SLT	SLT	NM	NM	NM
Elk							
Winter Range	NL	TL 12/1-4/1	CSU	SLT	49,329	Not Present	49,329
Calving	NL	TL 4/1-6/15	SLT	SLT	18,819	Not Present	18,819
Bighorn Sheep							
Summer/Winter Habitat	NL	NSO	CSU	CSU	51,021	69,285	120,306
Mule Deer							
Winter Range	NL	TL 12/1-4/1	CSU	SLT	48,772	57,257	106,029
Neotropical Migratory Birds							
Nesting	NL	TL 5/1-7/31	SLT	SLT	NM	NM	NM

Resource	Alternative 1 No Action / No Lease	Alternative 2 Forest Plan with Maximum Resource Protection	Alternative 3 Forest Plan with Moderate Resource Protection	Alternative 4 Forest Plan	Acres of Resources		
Other Critical Habitat (Vegetation Cover Types)					White Pine Divisio n	Grant- Quinn Division	Total Acres
Mountain Mahogany	NL	NSO	CSU	SLT	14,971	13,966	28,937
Riparian - Aspen	NL	NSO	CSU	SLT	1152	789	1,359
Great Basin Sub-Alpine (except Bristlecone)	NL	NSO	CSU	CSU	11,308	12,789	24,097
Bristlecone	NL	NSO	NSO	NSO	6,510	7,996	14,506
Rare Plants							
Forest Service Sensitive Plants							
Occupied Habitat	NL	NSO	NSO	SLT	NM	NM	NM
Threatened and Endangered Species	NL	SLT	SLT	SLT	NM	NM	NM
Nevada State Listed Species	NL	NSO	SLT	SLT	NM	NM	NM
Water Quality							
Riparian Areas							
GAP and Hydro-based	NL	NSO	NSO	NSO	17,025	10,461	27,486
Soils/Geology							
Erosion Hazard							
Less than 10% slopes	NL	SLT	SLT	SLT	71,992	35,650	107,642
10-25% slopes	NL	SLT	SLT	SLT	128,538	48,774	177,312
25-40% slopes	NL	NSO	CSU	CSU	83,453	50,524	133,977
Greater than 40% slopes	NL	NSO	NSO	CSU	66,705	84,280	150,985

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Acres of Resources		
Resource	No Action / No Lease	Forest Plan with Maximum Resource Protection	Forest Plan with Moderate Resource Protection	Forest Plan	White Pine Division	Grant- Quinn Division	Total Acres
Other							
Inventoried Roadless Areas ⁴							
Inventoried Roadless Area within 800 meters of boundary	NIL	NSO ¹	NSO ² /CSU ³	SLT ¹	122,305	83,989	206,294
Inventoried Roadless Area >800 meters from boundary	NIL	NL ¹	NL ² /CSU ³	SLT ¹	84,820	44,888	129,708
Recreation Opportunity Spectrum							
Primitive (PR)	NIL	NSO	NSO	NSO	15,839	50,491	66,330
Semi-Primitive Non-Motorized (SPNM)	NIL	CSU	CSU	SLT	199,316	127,135	326,451
Roaded Natural/Semi-Primitive Motorized (RN/SPM)	NIL	SLT	SLT	SLT	135,522	41,606	177,128
Wilderness	Withdrawn	Withdrawn	Withdrawn	Withdrawn	36,534	78,705	115,239
VQOs							
Retention (R)	NIL	NSO	NSO	NSO	37,960	78,705	116,665
Partial Retention (PR)	NIL	CSU	CSU	CSU	63,123	17,157	80,280
Modification, Maximum Modification (M, MM)	NIL	SLT	SLT	SLT	249,596	123,369	372,965
Administrative & Recreation Sites	NIL	NSO	NSO	NSO	193	112	305
Heritage Resources	NIL	SLT	SLT	SLT	NM	NM	NM

Table Notes:¹ Applies to all roadless areas as shown on Figures 3-18 and 3-19.² Applies to three (3) selected roadless areas as shown on Figures 2-6 and 2-7 and as described in Chapter 4 section 4.1.3.³ Applies to remaining roadless areas not shown on Figures 2-6 and 2-7.⁴ These figures do not show adjustments made through the White Pine County Lands Bill**Abbreviations:**

NL = No Lease

NSO = No Surface Occupancy

CSU = Controlled Surface Use

TL = Timing Limitations

SLT = Standard Lease Terms

NM = Not Mapped

Table 2-5: White Pine Division Availability and Restrictions by Alternative

Availability/Restrictions	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Not Available (Private Land)	4,994	4,994	4,994	4,994
Withdrawn (Wilderness)	36,534	36,534	36,534	36,534
No Lease	309,161	84,820	30,385	0
No Surface Occupancy	0	177,094	90,986	41,194
Controlled Surface Use	0	14,789	126,605	129,107
Controlled Surface Use with Timing Limitation	0	16,678	50,399	44,615
Standard Lease Terms	0	8,043	8,318	75,435
Standard Lease Terms with Timing Limitation	0	7,737	2,468	18,810
Total Lands Available	0	224,341	278,776	309,161
Total Acreage	350,689	350,689	350,689	350,689

Note: This table portrays acreage figures prior to the adoption of the White Pine County Lands Bill.

Table 2-6: Grant-Quinn Division Availability and Restrictions by Alternative

Availability/Restrictions	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Not Available (Private Land)	552	552	552	552
Withdrawn (Wilderness)	78,705	78,705	78,705	78,705
No Lease	139,971	44,888	29,319	0
No Surface Occupancy	0	89,217	52,083	20,668
Controlled Surface Use	0	764	57,717	68,322
Controlled Surface Use with Timing Limitation	0	314	0	0
Standard Lease Terms	0	852	852	50,981
Standard Lease Terms with Timing Limitation	0	3,936	0	0
Total Lands Available	0	95,083	110,652	139,971
Total Acreage	219,228	219,228	219,228	219,228

Table 2-7: Total Project Area Availability by Alternative

Availability/Restrictions	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Not Available (Private Land)	5,546	5,546	5,546	5,546
Withdrawn (Wilderness)	115,239	115,239	115,239	115,239
No Lease	449,132	129,708	59,704	0
Total Lands Available	0	319,424	389,428	449,132
Total Acreage	569,917	569,917	569,917	569,917

Note: This table portrays acreage figures prior to the adoption of the White Pine County Lands Bill.

CHAPTER THREE:

THE AFFECTED ENVIRONMENT

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1. INTRODUCTION

This chapter describes the environmental components of the White Pine and Grant-Quinn Divisions that may be affected by the implementation of any of the proposed alternatives for oil and gas leasing, exploration, development, and production. These environmental components are organized by general issue areas identified in Chapter Two.

Each discussion includes:

- *General Description.* This section provides the background information relevant to the issue and necessary to understand the effects of the alternatives.
- *Forest Plan Direction.* This section identifies the current level of Forest management of the resource.
- *Sensitive Resource Components.* This section discusses components of the resource that need special management consideration, and how the effect will be measured.

2. ECOLOGICAL INTEGRITY AND BIOLOGICAL DIVERSITY

2.1. Introduction

Biological diversity (also known as biodiversity) can be simply defined as the diversity of life and its ecological and evolutionary processes. The preservation of biodiversity is the primary goal of conservation biology. Nevada has approximately 110 species of mammals, 450 species of birds, 55 species of amphibians and reptiles, 65 species of fishes, 3,000 species of vascular plants, and an unknown number of invertebrates and microbial organisms. Many of these species are well-represented in the Project Area. Any land development project will impact biodiversity, usually negatively.

Ecological integrity is indicative of a healthy ecosystem that has intact composition, structure, function, and processes. Ecosystem management preserves ecosystem integrity by incorporating complex ecological processes and principles—such as succession, patch dynamics, and disturbance ecology—with the conservation of biodiversity. A disturbance regime incorporating varying levels of intensity with an intermediate amount of disturbance in both space and time supports the highest levels of diversity by coinciding with the life histories of the greatest number of species (Clark 1991; Collins 1992).

Biodiversity is most frequently expressed as species richness, but may also refer to diversity of ecosystems or diversity within gene pools. Thus, biodiversity can be evaluated on three different levels:

- Community or ecosystem diversity (i.e., the number of recognizable community or habitat types within a given area);
- Species diversity (i.e., the number of species within a given area); and
- Genetic diversity (i.e., amount of genetic variation present within the gene pools of species).

Increasingly, biodiversity is being recognized as crucial to ecosystem integrity and as an important natural resource on its own. Ecosystem integrity includes functional natural ecosystems with a full complement of native species and sufficient genetic variation within these species to allow them to persist and evolve. In general, biodiversity is critically important in maintaining the global life support system, including:

- Primary productivity,
- maintenance of soil fertility,
- regulation of the hydrologic cycle,
- control of climate, and
- maintenance of the composition and quality of the atmosphere.

In addition, many known and unknown species have the potential to provide crops, fibers, and medicines that either have not been discovered or have not been widely utilized.

Connectivity is the arrangement of habitats that allows organisms and ecological processes to move across that landscape. In areas with high connectivity, patches of similar habitats are either close together or linked by corridors of appropriate vegetation, riparian areas, and stream channels. Fragmentation of habitat is the isolating or splitting of similar habitat into smaller and more separated pieces. Roads, or a change in vegetation type, contribute to habitat fragmentation and disruption. Loss of connectivity, or fragmentation of habitat, prevents individuals between populations from interacting. Once populations isolate, the likelihood of persistence is greatly reduced. Usually, species with limited dispersal capabilities, refugia requirements, or that require large patches of habitat are more vulnerable to fragmentation.

2.2. General Description

2.2.1. The Great Basin as a Hydrologic Unit

The Project Area is located near the center of what is known as the “Great Basin”, a term coined by John C. Frémont in the mid-1800s to describe this internally-draining hydrographic unit in the arid West. The Great Basin covers an area of approximately 165,000 square miles centered on Nevada, and incorporates portions of eastern California, western Utah, south-central Oregon, and small portions of southeastern Idaho and adjacent Wyoming. The Great Basin is bordered to the west by the crest of the Sierra Nevada and southern Cascade Ranges, and to the east by the crest of the Wasatch Range. It is bordered by the edge of the Columbia River drainage to the north and the Colorado River drainage to the south. This area sits in the “rain shadow” of the Sierra Nevada and Cascade Ranges and is largely characterized as a desert. The precipitation within the Great Basin is largely restricted to higher elevations. This water flows into mountain streams that eventually disappear underground or empty into low, flat playa lakes, where it evaporates. Some streams are perennial, although most flow only in late winter and spring.

2.2.2. Natural History of the Great Basin

The topography of this region consists of numerous parallel, isolated mountain ranges that trend from north to south and are separated by a series of sub-basins. Most of these ranges were largely formed during the early Tertiary period. Strata are represented largely in deposits formed during the Paleozoic era, and include limestone, siltstone, shale, and sandstone. The Pleistocene era, or “Ice Age,” reached its peak about 18,000 years ago, and probably had the strongest influence on the modern-day distribution of vegetation and habitat types present in the Great Basin today (Antevs 1952). During this glacial period, temperatures were lower and the precipitation rate was approximately twice that of today; while at the same time the evaporation rate was half of today. This resulted in the formation of glaciers at higher elevations and many large pluvial lakes at lower elevations. The two largest of these pluvial lakes were Lake Bonneville in eastern Utah, which was nearly the size of modern-day Lake Michigan, and Lake Lahontan in northwestern Nevada, which was about the size of modern-day Lake Erie.

In response to colder climates during this Pleistocene period, life zones moved hundreds of miles southward in geography and thousands of feet down in elevation. A transition toward a warmer climate occurred approximately 10,000 years ago, during which time the coniferous forests retreated to higher altitudes and steppe vegetation became prominent (Bright 1966).

2.2.3. Forest Management Direction

Forest Service Manual 2622.01 requires Forest Land and Resource Management Plans to

... address biological diversity through consideration of the distribution and abundance of plant animal species and communities to meet overall multiple-use objectives.

This may be achieved by contributing to the recovery of federally-listed, threatened, or endangered species; by managing habitat to provide for the maintenance of viable populations of existing native and desired nonnative wildlife, fish, and plant species; by managing special plant and animal communities; and by management direction for selected management indicator species (MIS) (FSM 2622.01).

2.3. Threatened, Endangered, and Sensitive Species

2.3.1. General Description

In order to maintain biodiversity, the *Endangered Species Act of 1973* (ESA) requires Federal agencies to ensure that any activities they carry out or authorize do not jeopardize the continued existence of any species that is federally-listed as threatened or endangered. The U. S. Fish and Wildlife Service (USFWS) is the regulatory agency through which formal and informal consultation on threatened and endangered species (TES) must be conducted. A species that is federally listed as “endangered” by USFWS is currently in danger of extinction throughout all or a significant portion of its range. A species that is listed as “threatened” by USFWS is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. “Proposed species” are those that have already been proposed to be listed as either threatened or endangered, but have not yet been formally listed. “Candidate species” are those species that the USFWS has sufficient information on their biological vulnerability and threats to support proposals to list them as endangered or threatened, but have not yet been formally proposed. The USFWS amended their candidate policy in 1996 (61 FR 7457, Feb 28, 1996) and removed candidate categories 1 and 2 from their reporting system.

2.3.1.1. Consultation with U.S. Fish and Wildlife Service

A list of threatened, endangered, proposed, and candidate species potentially occurring on the White Pine and Grant-Quinn Divisions of the H-T NF was requested and obtained from the USFWS (USFWS, File No. 1-5-04-SP-168, June 15, 2004; and was updated by the USFWS on March 12, 2007). These lists identified the Bald Eagle, a threatened species, and the yellow-billed cuckoo, a candidate species, as potentially occurring in the Project Area. In addition, the USFWS did not consider the Project Area to be critical habitat for any currently listed species. Should threatened or endangered species, or critical habitat for these species be identified at a later date on leased lands, a lease notice would be attached to the lease to inform the leasee of the presence of such species or its habitat. Protection of these species and their habitats would be ensured through the ESA rather than through a lease stipulation.

2.3.1.2. Region 4 Regional Forester’s Sensitive Species

The Forest Service has identified a list of sensitive species on the Ely Ranger District that may occur in the Project Area. *Forest Service Manual 2670.5* defines sensitive species as

... those plant and animal species identified by the Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers, density, or habitat capability that reduce a species/existing distribution.

In *FSM 2670.22*, management direction for sensitive species is, in part, to ensure that species do not become threatened or endangered because of Forest Service actions, and to maintain viable populations of all native species. It is important to address these species early in the land management planning process to consider possible long-term conservation needs, including having to avoid future population declines and the need for Federal listing.

This EIS hereby incorporates by reference the *Biological Assessment and Biological Evaluation (BA/BE)* in the Project Record. The *BA/BE* contains the detailed data, methodologies, analyses, conclusions, maps, references, and technical documentation that the specialist relied upon to reach the conclusions in this EIS.

Table 3-1: Regional Forester's (Region 4) Sensitive Species List for Ely Ranger District / White Pine and Grant-Quinn Divisions

Common Name	Species
Mammals	
Pygmy rabbit	<i>Brachylagus idahoensis</i>
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>
Spotted bat	<i>Euderma maculatum</i>
Birds	
Northern goshawk	<i>Accipiter gentilis</i>
Greater sage-grouse	<i>Centrocercus urophasianus</i>
Flammulated owl	<i>Otus flammeolus</i>
Three-toed woodpecker	<i>Picoides tridactylus</i>
Peregrine falcon	<i>Falco peregrinus anatum</i>
Fish	
Bonneville cutthroat trout	<i>Oncorhynchus clarki utah</i>
Plants	
Eastwood milkweed	<i>Asclepias eastwoodiana</i>
Scorpion milkvetch	<i>Astragalus lentiginosus</i> var. <i>scorpionis</i>
Current milkvetch	<i>Astragalus uncialis</i>
Upswept moonwort	<i>Botrychium ascendens</i>
Dainty moonwort	<i>Botrychium crenulatum</i>
Goodrich biscuitroot	<i>Cymopterus goodrichii</i>
Cave Mountain fleabane	<i>Erigeron cavernensis</i>
Basin jamesia	<i>Jamesia tetrapetala</i>
Maguire bitterroot	<i>Lewisia maguirei</i>
Mt. Moriah penstemon	<i>Penstemon moriahensis</i>
Nevada primrose	<i>Primula nevadensis</i>
Marsh's bluegrass	<i>Poa abbreviate</i> var. <i>marshii</i>
Nachlinger catchfly	<i>Silene nachlingerae</i>
Jones' globemallow	<i>Sphaeralcea caespitosa</i> var. <i>williamsii</i>
Current Mountain clover	<i>Trifolium andinum</i> var. <i>podocephalum</i>
Rock violet	<i>Viola Lithion</i>

2.3.2. Forest Management Direction

The *Humboldt National Forest Land and Resource Management Plan* (Forest Plan 1986) directs managers to provide habitat for sensitive and federally-listed threatened and endangered species. Specific management direction in the Forest Plan that either directly or indirectly applies to threatened endangered and sensitive species management includes:

- Require new special uses to be designed to limit the loss of any wildlife habitat to the least amount possible. (page IV-28)
- Cooperate with NDOW and USFWS in recovery of the peregrine falcon. (page IV-29)
- Protect key sage grouse breeding complexes; i.e., strutting grounds and associated nesting areas. (page IV-30)
- Maintain sensitive plant species. (page IV-6)

2.3.3. Sensitive Resource Components

Of the Regional Forester's (Region 4) Sensitive Species that inhabit the project area, the greater sage-grouse, goshawk, pygmy rabbit, and flammulated owl have the greatest potential for impacts from oil and gas leasing and will be considered Sensitive Resource Components. All of the Regional Forester's (Region 4) Sensitive Species are analyzed in the BA/BE on file in Project Record.

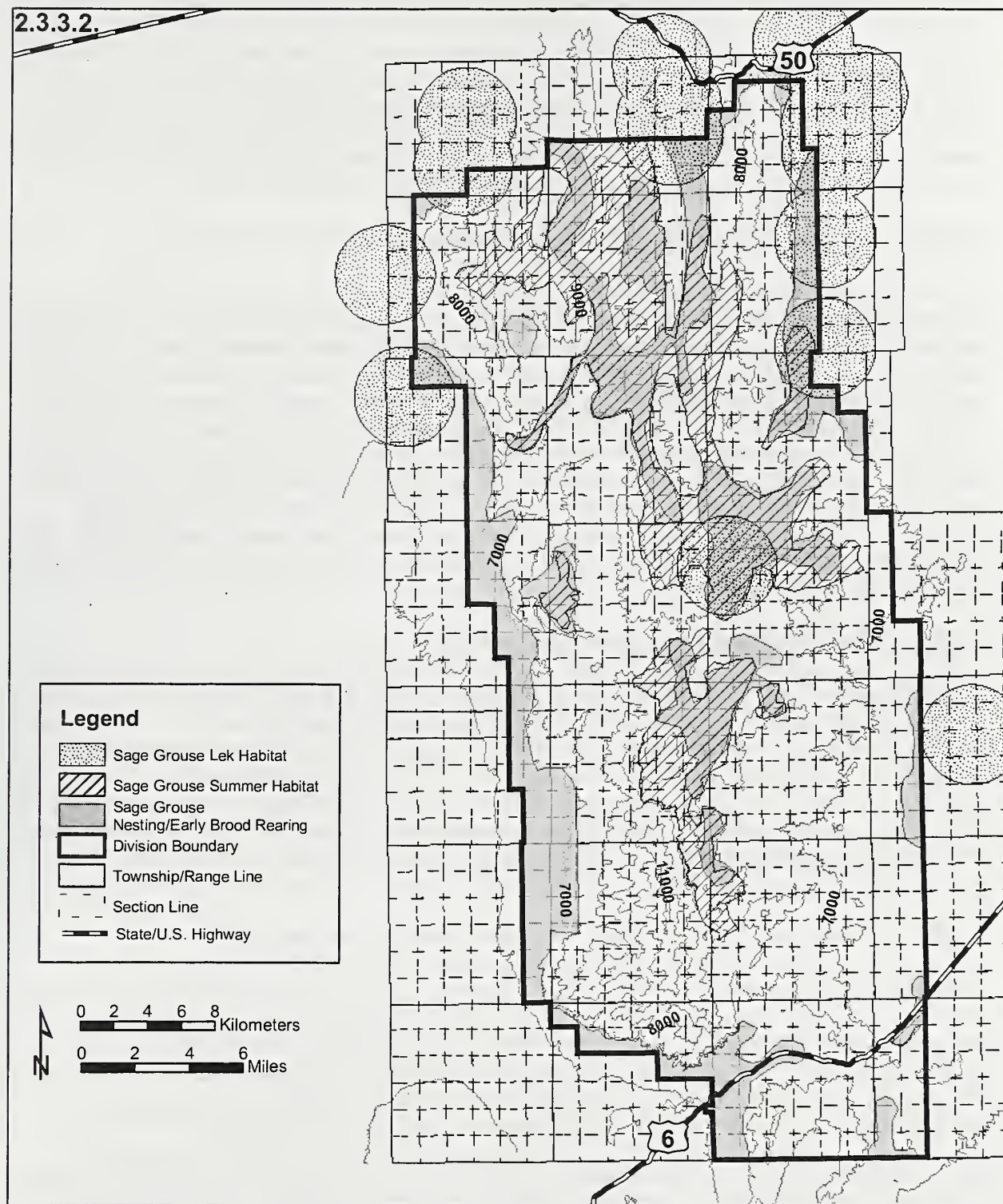
2.3.3.1. Greater Sage-Grouse (*Centrocercus urophasianus*)

Greater sage-grouse are a sensitive and a management indicator species (MIS) for the H-T NF. The grouse range from southern British Columbia, Alberta, and Saskatchewan; south to western Colorado, Utah, Nevada, and eastern California. Greater sage-grouse populations are known to fluctuate dramatically from year to year, but historical data suggests that these animals are on the decline throughout their range (Braun 1998; Connelly and Braun 1997). In Nevada, they occupy the northern two-thirds of the state. Greater sage-grouse prefer open country such as plains, foothills, and sagebrush semi-deserts. They tend to utilize lower elevation sites for leks (i.e., mating grounds) and often rely on slightly higher elevation sites for nesting and brooding. At least five strutting grounds are known to exist in the White Pine Division; there are no known strutting grounds in the Grant-Quinn Division.

Greater sage-grouse summer and nesting/early brood rearing habitat is primarily confined to the lower elevations along the eastern slopes in the Grant-Quinn Range. Summer and nesting/early brood rearing in the White Pine Range is primarily located along the north-central part of the mountain range (see Figure 3-1). This habitat is not only utilized by year-round resident greater sage-grouse, but is also used by a large number of greater sage-grouse migrating into the forest from surrounding lands at lower elevations.

Greater sage-grouse winter habitat is primarily confined to lower elevation habitat, non-NFS lands along the eastern side of the Grant-Quinn Range. Winter habitat in the White Pine Range primarily overlaps with the mapped summer and nesting/early brood rearing habitat.

Figure 3-1: White Pine Division— Sage Grouse Leks, Nesting and Early Brooding, and Summer Habitat



2.3.3.3. Pygmy Rabbit (*Brachylagus idahoensis*)

Pygmy rabbits, known to inhabit the White Pine and Grant-Quinn Divisions, are considered a sensitive species. Found in dense stands of big sagebrush (*Artemisia tridentata*) and rabbitbrush (*Chrysothamnus* spp.) growing in deep soils, the species is highly dependent on sagebrush to provide both food and shelter, with big sagebrush being their primary food source. Unlike other species of rabbits, the pygmy rabbit digs its own burrows. Pygmy rabbits are found where sagebrush cover is sufficiently tall and dense, and where soils are sufficiently deep and loose to allow burrowing.

2.3.3.4. Northern Goshawk (*Accipiter gentiles*)

The northern goshawk, known to nest in the White Pine and Grant-Quinn Divisions, is a sensitive species and a MIS. Nesting habitat for the northern goshawk in Nevada is typically in aspen, generally between 6,000 and 10,000 feet in elevation. Aspen occurs in naturally fragmented stands surrounded by shrub steppe or mountain brush communities and is often limited to riparian areas and adjacent slopes. Ground squirrels are the main prey for northern goshawks during the nesting season. Northern goshawks may winter in the nesting habitat, migrate to lower elevations, or migrate out of the State (Neel 1999, page 54-56). Goshawks use a variety of habitats for foraging; foraging habitat may be as closely tied to prey availability as to any single habitat composition or structure (Wisdom et al. 2000, page 42). A northern goshawk territory contains multiple nest sites, and use of specific nests probably alternates yearly. Although northern goshawks forage in a larger area around the nest stand, mature forest remains important for both foraging and roosting. Their prey consists of numerous species of small- and medium-sized birds and mammals.

2.3.3.5. Flammulated Owl (*Otus flammeolus*)

Flammulated owls, which are known to nest within both the White Pine and Grant-Quinn Divisions, are a sensitive species and a neotropical migrant. Their summer habitat is usually found in mature stands of white fir, subalpine fir, and limber pine; open stands of large Jeffrey pine; and ponderosa pine mixed with aspen (Neel 1999, page 82) (see Figures 3-11 and 3-12). In Nevada, flammulated owls will also use old aspen stands (Hayward and Verner 1994, page 22). Roosting occurs in fairly dense stands, while more open stands are utilized while foraging for insects, mainly moths. These owls nest in the cavities of snags and large live trees that have been excavated by woodpeckers (Wisdom et al. 2000; page 40-42; Hayward and Verner 1994, page 25-26, 28).

2.3.3.6. Peregrine Falcon, Bats, and Three-toed Woodpecker

Peregrines often nest on ledges or holes on the face of rocky cliffs or crags. Nests typically are situated on ledges of vertical rocky cliffs, commonly with a sheltering overhang. Ideal locations include undisturbed areas with a wide view, near water, and close to plentiful prey. Substitute man-made sites include tall buildings, bridges, rock quarries, and raised platforms. They feed primarily on birds (medium-size passerines up to small waterfowl); but also eat small mammals (e.g., bats, lemmings), lizards, fishes, and insects (by young birds). Prey pursuit is initiated from perch or while soaring.

The Townsend's big-eared bat is associated with caves and mines. They primarily use pinyon-juniper-mahogany, white fir, blackbrush, sagebrush, salt desert scrub, agricultural, and urban habitats (Bradley et al. 2006, page 19). This species roosts communally on the ceilings of cave-like structures (caves, mines, and buildings) and feeds primarily (90 percent) on moths (Wisdom et al. 2000, page 120).

The spotted bat is closely associated with rocky cliffs. It has been found in a variety of habitats from low elevation desert scrub to high elevation coniferous habitats, including pinyon-juniper, sagebrush, riparian and on urban high-risc (Bradley et al. 2006, page 23). These bats roost individually or in small colonies in rock crevices usually high on steep cliff faces (Wisdom et al. 2000; page 124). Their roost sites are usually associated with nearby water. Spotted bats mainly prey on moths.

In Nevada, the three-toed woodpecker is found in Engelmann spruce forest in association with white fir, limber pine, bristlecone pine, and aspen. Its preferred habitat within the forest canopy is often in decadent, diseased, or burned portions of the canopy. It inhabits areas where dead timber remains after fires or logging. It forages for insects by scaling the outer bark of trees.

2.3.3.7. Forest Service Sensitive Plant Species and State of Nevada Rare Plant Species

There are 21 sensitive plants from the Region 4 Regional Forester's Sensitive Species list that are known, or have the potential, to occur within the White Pine and Grant-Quinn Divisions. Rare or sensitive plants for Nevada are found on the Nevada Natural Heritage Sensitive and Watch lists. Habitats for these plants within the Project Area vary from high elevation mountain areas, to riparian, to sagebrush habitats. Few surveys have been completed within the Project Area. These plant species are considered sensitive resource components. All of the Regional Forester's (Region 4) Sensitive Species are analyzed in the BA/BE on file in the Project Record.

2.4. Wildlife

2.4.1. General Description

This analysis will focus largely on desert bighorn sheep, mule deer, Rocky Mountain elk, neotropical migratory birds, and raptors. Plant communities are discussed in the riparian and aquatic ecosystem section and in the vegetation communities section.

2.4.2. Forest Management Direction

Management direction for wildlife is based on the protection and preservation of threatened and endangered species and their habitat, and protection of big game range and productivity (Forest Plan 1986). Although the Forest Plan is largely oriented to single-species management, some direction statements are interpreted as covering a broader range of issues. Specific wildlife management directions in the Forest Plan include:

- Require new special uses to be designed to limit the loss of any wildlife habitat to the least amount possible. (page IV-28)
- Protect complexes comprised of moist habitats and adjacent security areas. (page IV-29)
- Restrict oil and gas exploration and development activities in key big game habitat. (page IV-29)
- Improve or maintain the quality and quantity of terrestrial and riparian habitats. (page IV-30)
- Manage desert bighorn sheep winter and summer range. (page IV-182, IV-188)
- Protect key desert bighorn sheep winter habitat in Irwin Canyon, Troy Canyon, and Little Meadows. (page IV-188)
- Big game winter ranges will be maintained at current production levels. (page IV-186)

The *National Forest Management Act* (NFMA 1976) also provides direction for selecting MIS for Forest planning. MIS are animal species that help indicate the effects and influences of land management on large groups of wildlife. MIS habitats are monitored to determine what population changes, if any, are induced by management activities. The four MIS used by the Forest Plan are mule deer, greater sage-grouse, northern goshawk, and trout (Plan, II-11). The effects of each alternative to each MIS species are analyzed in the “Environmental Consequences” section.

Trout are an MIS and occur in some of the perennial streams within the Project Area. All of the perennial streams are protected under the Riparian Areas Stipulation requiring No Surface Occupancy (NSO) within a 30 meter (98 feet) buffer zone. Due to this stipulation, no habitat features that are important to trout would be affected, and no negative impacts are expected to any trout species. Therefore, they are not discussed in Chapter IV.

2.4.3. Sensitive Resource Components

2.4.3.1. Raptors (Various Species)

Most raptor nesting sites within the Project Area can be found in riparian areas where aspen and cottonwood galleries provide large enough trees for nesting opportunities or in open country with scattered trees or woodland areas. Raptors are extremely loyal to nesting sites and often return to the same site, and even the same nest, for many breeding seasons. Raptor species that are known to nest within the Project Area and that are often associated with aspen, cottonwood, and sometimes subalpine communities include:

- American kestrel
- Cooper’s hawk
- Flammulated owl
- Great horned owl
- Long-eared owl
- Northern goshawk
- Pygmy owl
- Red-tailed hawk
- Saw-whet owl
- Sharp-shinned hawk

Raptors known to nest within the Project Area and that are often associated with woodland or open country with scattered trees include only the ferruginous hawk. Areas of historically high raptor nesting utilization have been identified within the Project Area. Known raptor nest areas are shown in Figures 3-2 and 3-3.

Figure 3-2: White Pine Division Raptor Nests

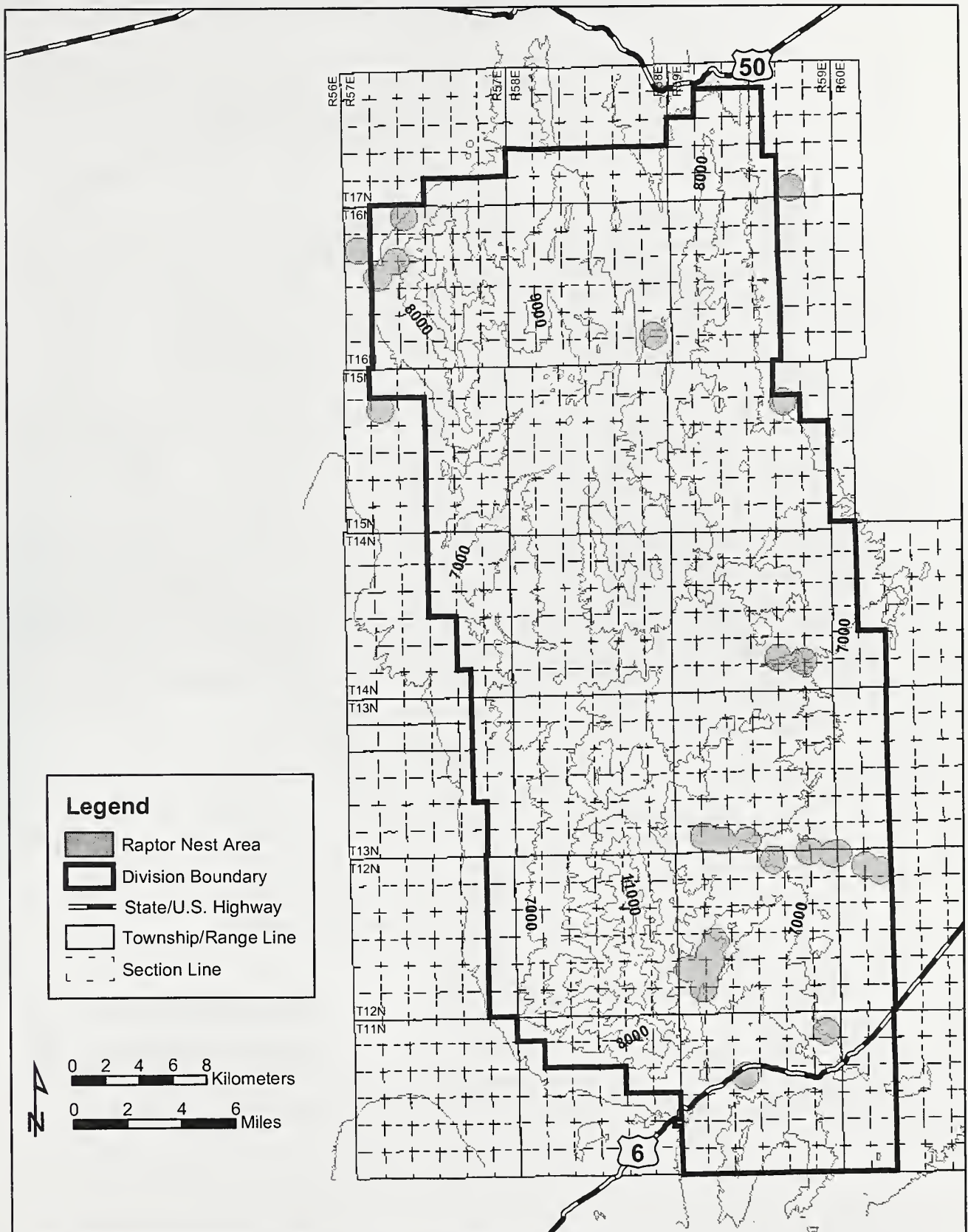
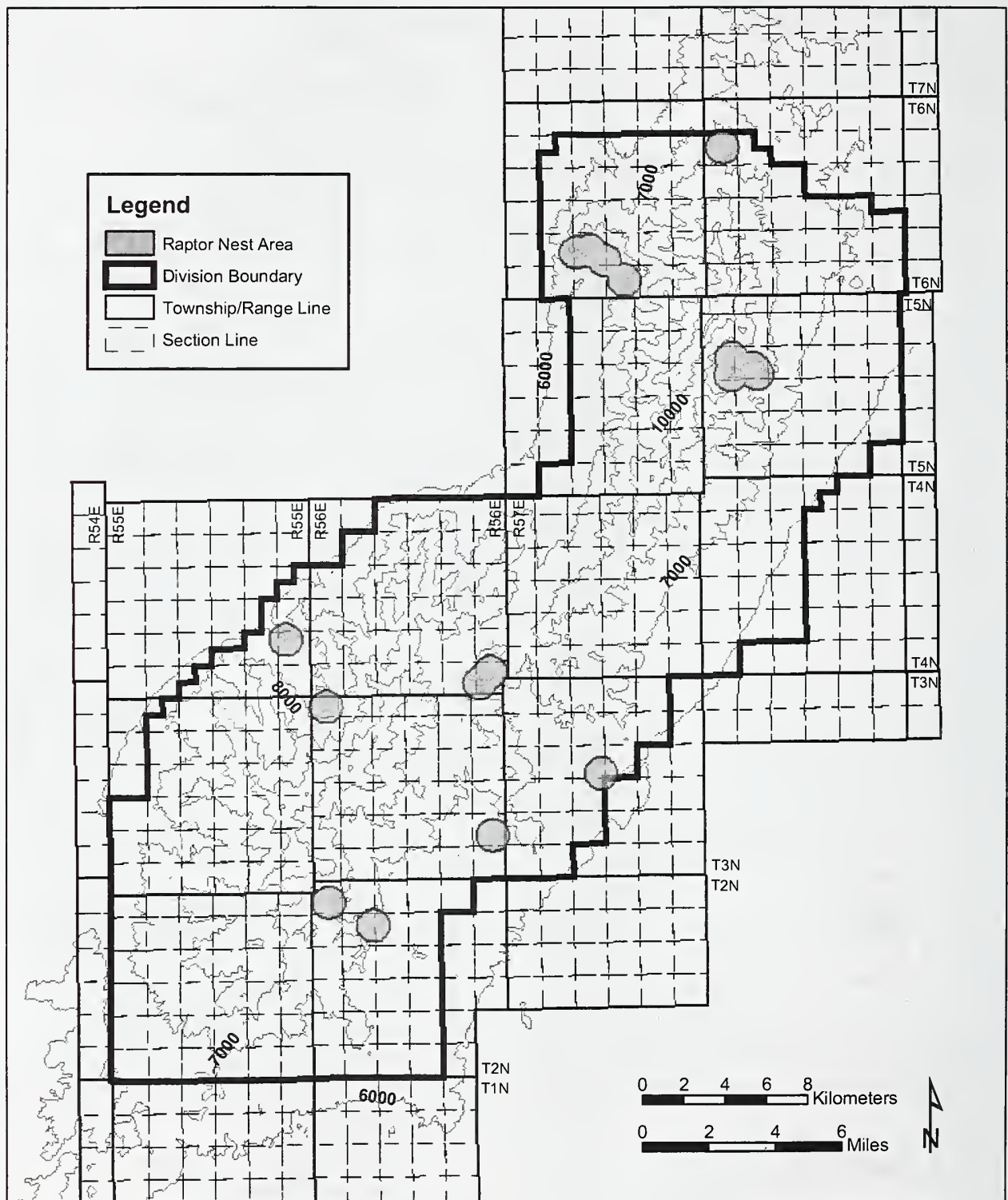


Figure 3-3: Grant-Quinn Division – Raptor Nest Areas



2.4.3.2. Desert Bighorn Sheep (*Ovis canadensis nelsoni*)

It has been estimated that bighorns used to be the most numerous and most widely distributed large ungulate throughout Nevada. The statewide estimate in 2001 was 6,500 bighorn sheep in 74 mountain ranges. This decline has been attributed to European settlement and the subsequent introduction of diseases as well as the alteration and/or destruction of bighorn habitat (Turnipseed, 2001, pg. 4).

Two desert bighorn sheep herds occur within the Project Area (Figure 3-4 and 3-5). The Troy Canyon area in the Grant Range is home to a resident herd of desert bighorn sheep. An early estimate in 1959 indicates a population of 200+ bighorns on the winter range in Troy canyon. In 1961 a ground survey showed 66 bighorns between Little Meadows Creek and Irwin Canyon. Since then the population has fluctuated, but overall has shown a declining trend. The bighorn habitat in the Troy Canyon area from Little Meadows Creek to Irwin Canyon and the upper elevations near Troy peak is still intact and permanent water is available at Little Meadows, Troy and Irwin Canyons. The extreme ruggedness has resulted in minimal grazing by livestock or wild horses. This herd was augmented with 26 sheep in October 2005 and with 22 sheep in January 2007.

Another herd is located in the Currant Mountain Wilderness Area on the southern end of the White Pine Range. There have been relatively frequent sightings of small groups of desert bighorn sheep in the late 1980s. NDOW released 25 desert bighorn sheep from the Monte Cristo Range into this herd area in mid-January 1999. Telemetry tracking of six (6) ewes has shown that these sheep have dispersed widely, and half the radio collared sheep had moved across the valley to a range of hills with lower tree cover by September 1999. During a 2005 helicopter deer survey 10 rams from this herd was observed. The present population is estimated at about 50 (Cox 2007)

Figure 3-4: White Pine Division – Bighorn Sheep Range

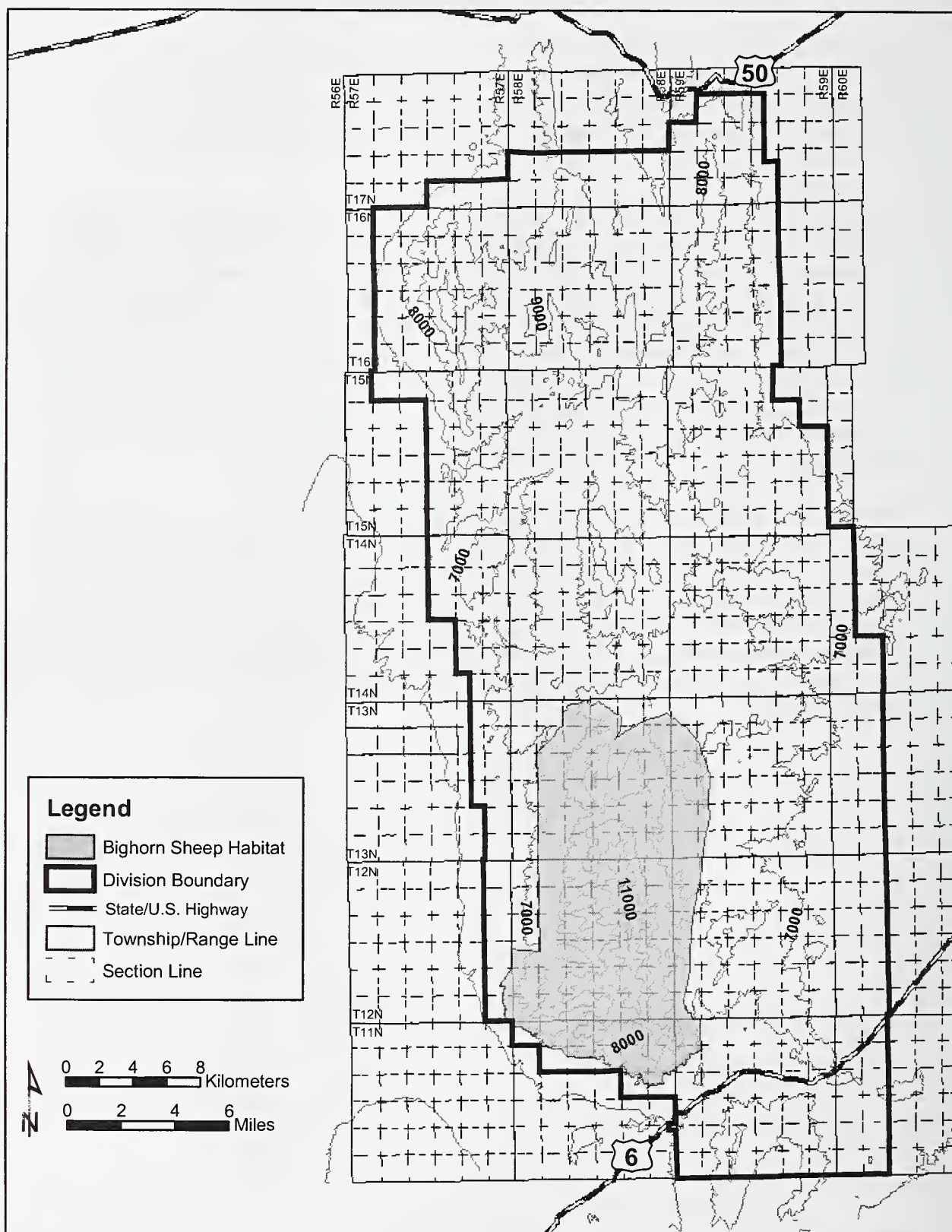
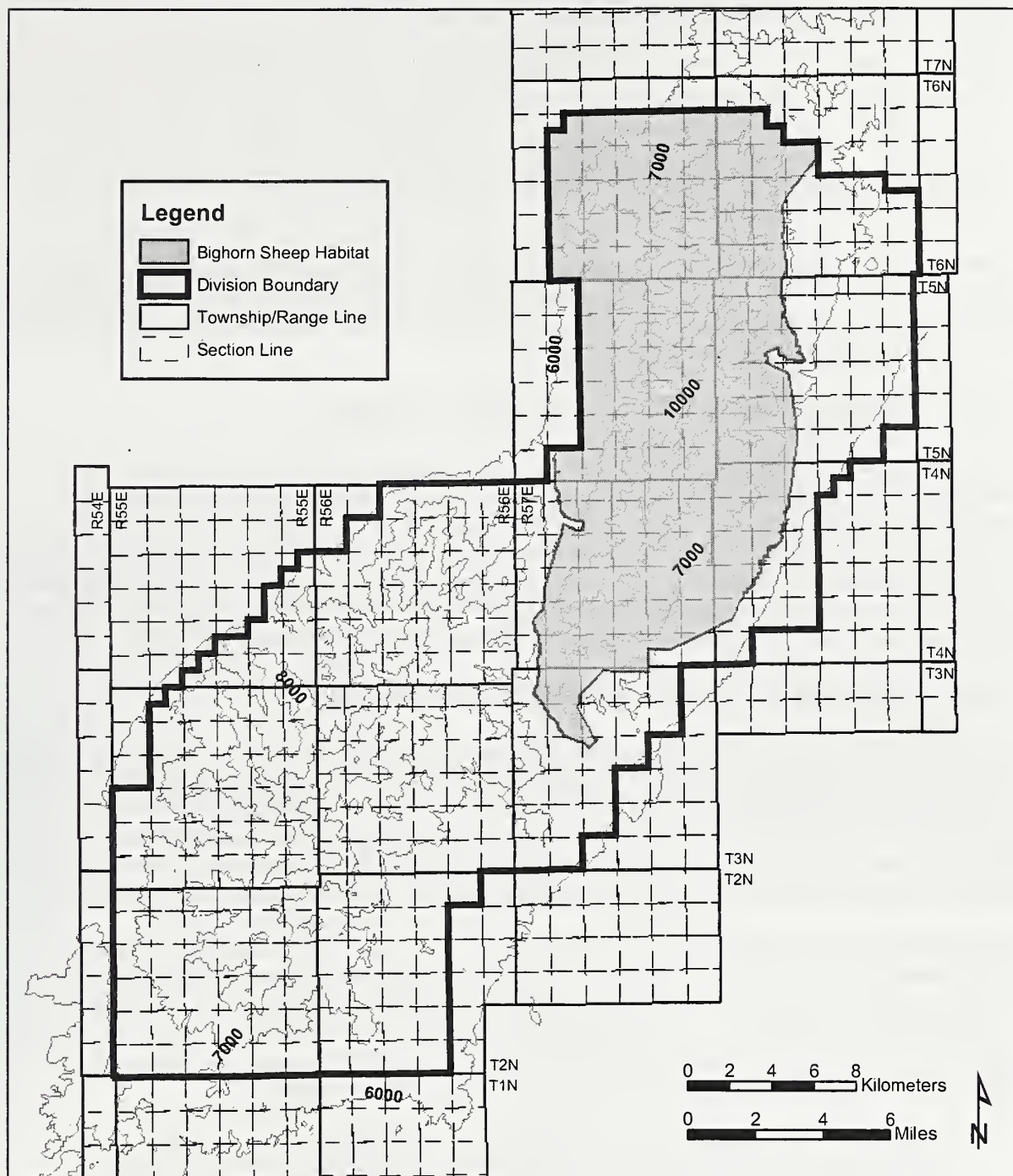


Figure 3-5: Grant-Quinn Division – Bighorn Sheep Range



2.4.3.3. Mule Deer (*Odocoileus hemionus hemionus*)

The Ely Ranger District has some of the best deer hunting in Nevada. Mule deer numbers in the White Pine Range peaked around 1986–87 and then declined sharply from the late 1980s through the mid-1990s due to a series of droughts. Important winter range for mule deer is located at low elevations in the White Pine Range along the western Forest boundary and along Ellison Creek on the eastern side of this range. Important winter range is also located along the entire eastern Forest boundary in the Grant and Quinn Canyon Ranges (Figures 3-6 and 3-7).

Summer range for mule deer is normally above 6,500 feet in elevation within both mountain ranges. Mule deer will fawn in many of the same habitats that elk calf. In the White Pine and Grant/Quinn Range they also move up into the mountain brush communities to fawn. The fawning is dispersed throughout much of this habitat, although data here is limited.

2.4.3.4. Rocky Mountain Elk (*Cervus elaphus nelsoni*)

Elk have increased in east-central Nevada, and an elk herd has recently become established in the White Pine Range within the Project Area. This herd, estimated at 170 animals, is thought to have been established by animals from the nearby Schell Creek Range. Year-round habitat for this herd, particularly winter range, has been identified in the northeastern portion of the White Pine Division. Although elk calving areas comprise a relatively small number of acres, they are a very important component of the elk range. The majority of the calving areas in the White Pine Division are within a half-mile of riparian areas or water sources. These areas would also be used as deer fawning areas (Figure 3-8).

2.4.3.5. Neotropical Migratory Birds (Various species)

Some of the bird species that inhabit the White Pine and Grant-Quinn Divisions are neotropical migrants, which are loosely defined as belonging to a group of birds that seasonally migrate north from the tropics in spring to breeding habitat in North America, and south in winter to wintering areas in Mexico and South America. This means they are only present during the spring, summer, and fall as they follow migration routes. Hundreds of species of birds in North America fall into the category of neotropical migrant. Over 300 species of neotropical migratory birds could potentially occur in the Project Area.

Neotropical migratory birds have become a concern in recent years due to declining populations; this decline results partially from the degradation of summer breeding habitat. The Forest Plan provides no direction regarding migratory breeding birds. The *Migratory Bird Treaty of 1918* provides protection for all migratory birds. Under this Act it is unlawful to take, import, export, possess, buy, sell, purchase, or barter any migratory bird. Executive Order 13186 (January 10, 2001) addresses the responsibilities of Federal agencies to protect migratory birds by directing regulatory agencies to

...ensure that environmental analyses of Federal actions required by the NEPA or other established environmental review processes evaluate the effects of actions and Agency plans on migratory birds, with emphasis on species of concern.

These birds inhabit a wide variety of habitats from grass/shrub communities to aspen stands to dense mature and old forests to alpine habitats.

¹ Using the *Nevada Partners in Flight Bird Conservation Plan* (Neel 1999), the *Partners in Flight North American Landbird Conservation Plan*, and NDOW's *Comprehensive Wildlife Conservation Strategy* (CSWS) the species listed in Table 3-2a will be used for the habitat types.

Table 3-2a: Habitat type and Neotropical species represented

Habitat Type	Species Selected
Aspen	Northern goshawk, orange-crowned warbler, flammulated owl, and Lewis woodpecker
Cliffs and Talus	Prairie falcon
Coniferous	Cooper's hawk and olive-sided flycatcher
Montane Riparian	MacGillivray's warbler and willow flycatcher (subspecies <i>adastus</i>)
Montane Shrub	Black rosy finch
Mountain Mahogany	Black-throated gray warbler
Pinyon/Juniper	Pinyon jay and gray vireo
Sagebrush	Brewer's sparrow.

Figure 3-6: White Pine Division – Mule Deer Winter Range

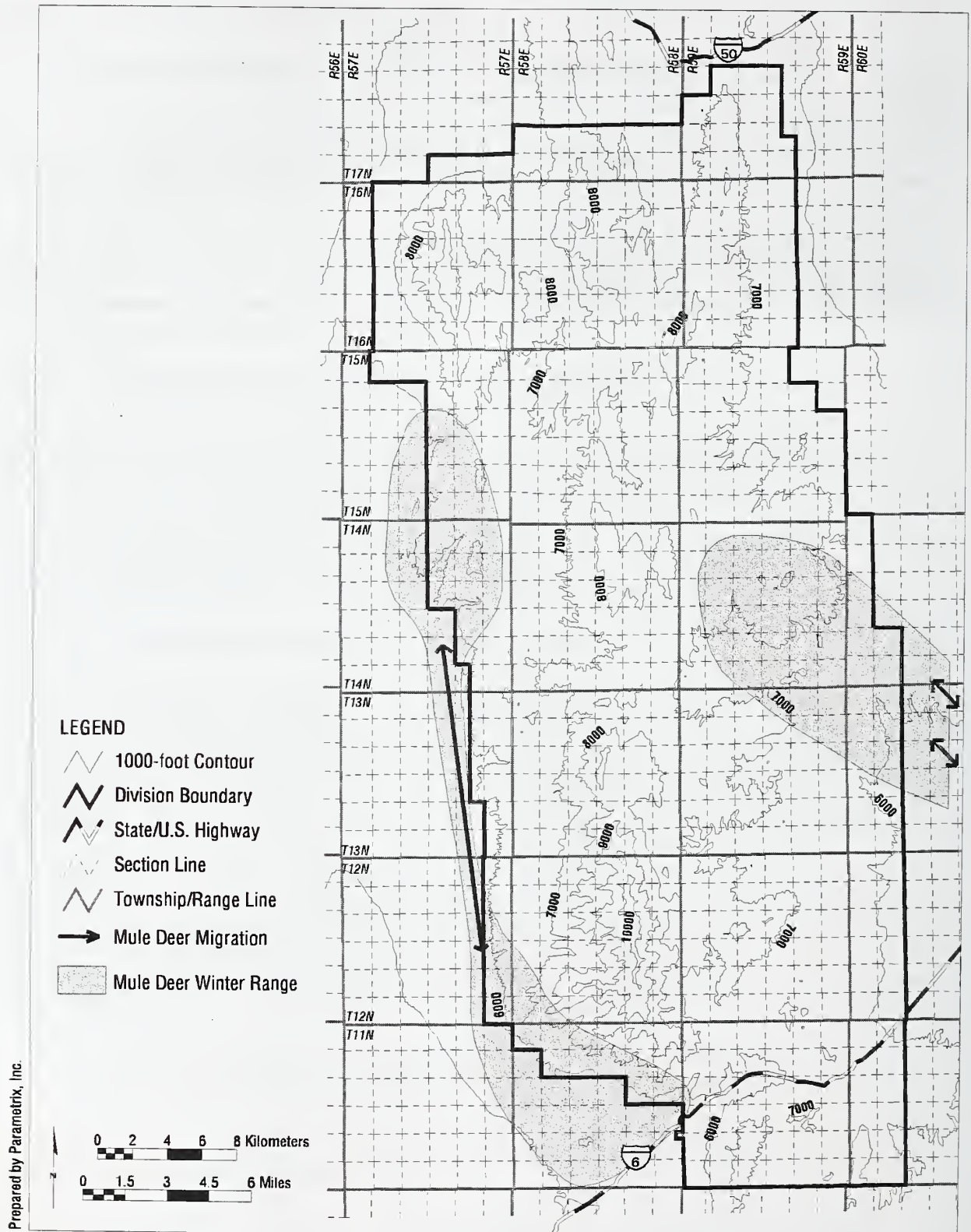


Figure 3-7: Grant-Quinn Division - Mule Deer Winter Range

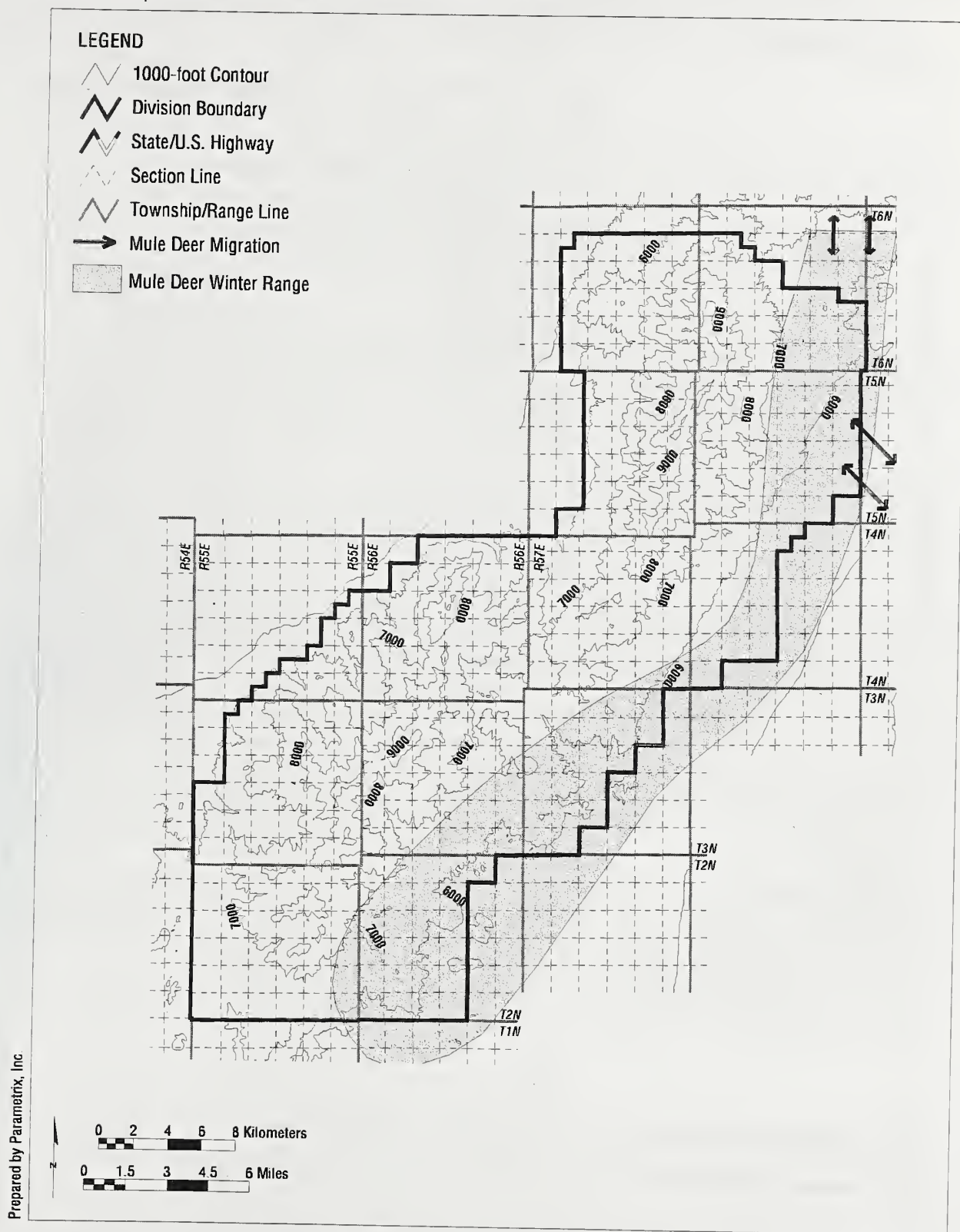
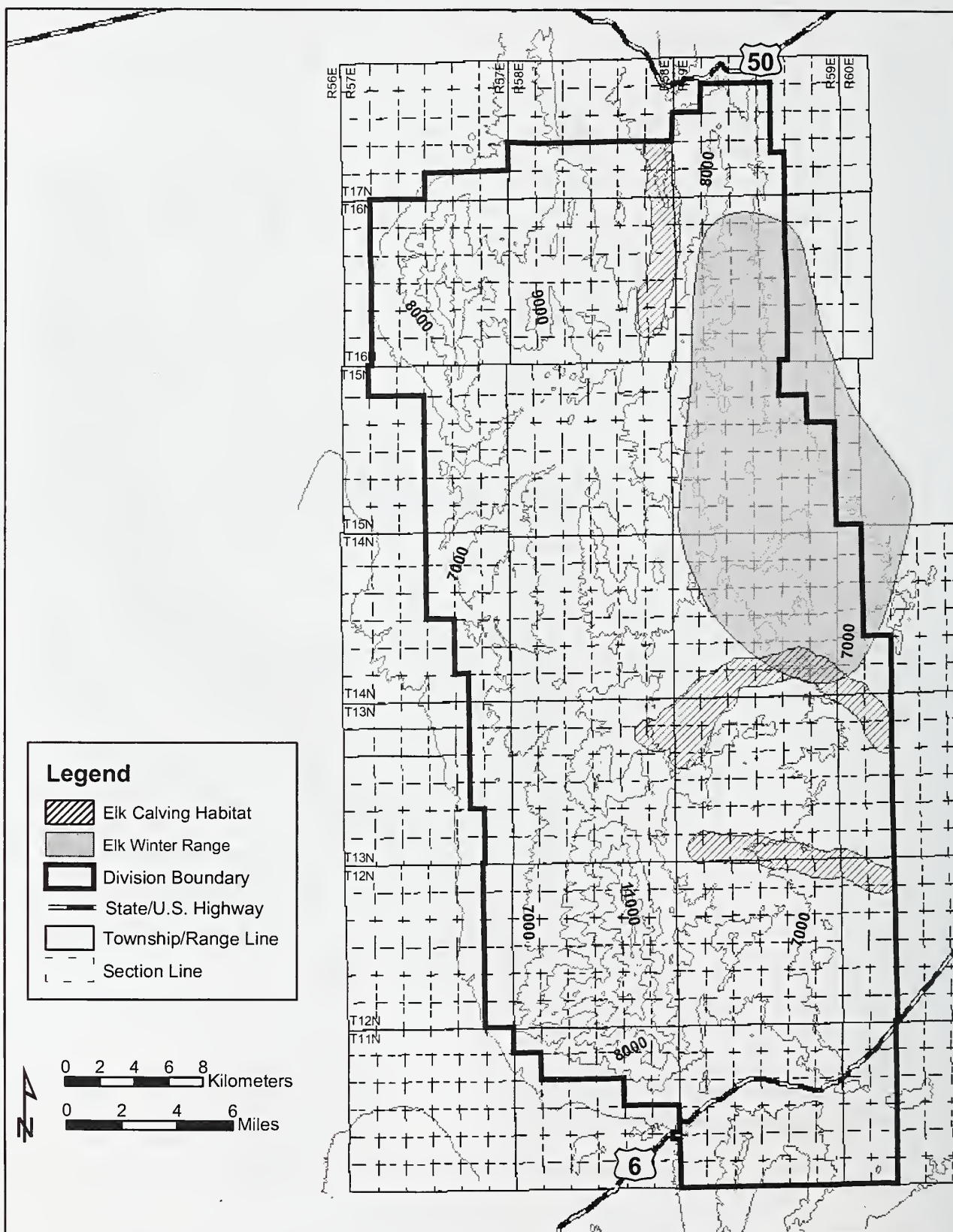


Figure 3-8: White Pine Division – Elk Winter Range and Calving Grounds



2.5. Aquatic and Riparian Ecosystems, Including Surface Water Quality

2.5.1. General Description

The majority of the Project Area is located within both the Great Basin hydrophysiographic region and the Carbonate Rock Province. This region is characterized by an arid climate, where annual precipitation ranges from less than 10 inches in the valleys to about 25 inches in the highest mountains. In the Carbonate Rock Province, much of this precipitation infiltrates through the soil profile into fractures and solution channels within the carbonate bedrock to become groundwater. Thus, surface water and associated aquatic and riparian ecosystems are extremely limited in extent.

Aquatic and riparian ecosystems comprise less than 0.5 percent of lands within the Project Area. Yet these habitats are significant in supporting biodiversity, and they perform critical ecosystem functions in maintaining dependent fish and wildlife populations, filtering and storing runoff and sediment produced by the watershed, and attenuating floods. These habitats are important for human uses, such as recreation, livestock grazing, and water diversion/development for agricultural or domestic uses.

Aquatic ecosystems are defined as “environments characterized by the presence of standing or flowing water” (Forest Service Manual 2605). Within the Project Area, aquatic ecosystems are associated with streams, springs, seeps, and ponds. For the purposes of this analysis, they also include wetlands and wet meadows.

Riparian ecosystems are defined by the EPA as a vegetated ecosystem along a water body through which energy, materials, and water pass (EPA 2005). Riparian areas characteristically have a high water table and are subject to periodic flooding and influence from the adjacent water body. These systems encompass wetlands, uplands, or some combination of these two landforms. They will not in all cases have all the characteristics necessary for them to be also classified as wetlands.

The EPA defines wetlands as those areas that are inundated or saturated by surface water or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (EPA 2005).

The location and extent of aquatic habitats and riparian areas have been analyzed in GIS, based on buffers surrounding delineation of streams and springs on U.S. Geological Survey (USGS) cartographic feature files. These buffers are 30 meters (approximately 98 feet) surrounding the outer edge of any aquatic and riparian area. A 15 meter (approximately 49 feet) buffer is used for seasonal, or intermittent aquatic and riparian ecosystems. For the purposes of this analysis, this includes seasonal streams, springs, seeps, and ponds. These buffers were used to include the riparian, or aquatic, zone and the 100-year flood plain.

White Pine Division

Only 75 miles, or 5.6 percent of all streams in the White Pine Division, are perennial. These perennial streams are located in 7 of the 16 major 6th Code Watersheds. The remaining nine watersheds contain only intermittent or ephemeral channels, for a total of 1,263 miles of seasonal streams.

The White Pine Division also supports 222 springs, with 43 percent of those concentrated in the White River and Ellison Creek watersheds. The remaining springs are widely spaced. Spring distribution within 6th Code Watersheds is shown in Figure 3-9.

Grant-Quinn Division

Only 48 miles, or 5.7 percent of all streams in the Grant-Quinn Division, are perennial. These perennial streams are located in 9 of the 15 major 6th Code Watersheds. The remaining six watersheds contain only intermittent or ephemeral channels, for a total of 781 miles of seasonal streams.

The Grant-Quinn Division also supports 76 springs, with 30 percent concentrated in the Cottonwood Creek Watershed. The remaining springs are widely spaced. Spring distribution within 6th Code Watersheds within the Project Area is shown in Figure 3-10.

Quality of surface water and aquatic habitat in streams is directly linked to channel stability and integrity of riparian habitat. Channel stability, including maintenance of stream dimension, pattern, and profile is dependent on a balance of sediment load, sediment size, and discharge within each watershed (Lane 1955). Also, "riparian vegetation plays an integral role in this stabilization" of streams (Mount 1995, page 250). "Changes in discharge and size or quantity of sediment load will cause shifts within the channel . . . through modification of the channel shape and gradient by deposition, channel incision, abandonment, or lateral migration" (Mount 1995, page 134). Thus, watershed disturbances, which can alter discharge or sediment supply, typically have adverse effects on stream stability, quality of water, and aquatic habitat. These watershed disturbances include both natural events (such as fire and catastrophic floods) and use activities (such as road building, water diversion or development, vegetation conversions [i.e., "chaining" or herbicide application], grazing, and mining).

Figure 3-9: White Pine Division – Sixth Code Watersheds and Springs

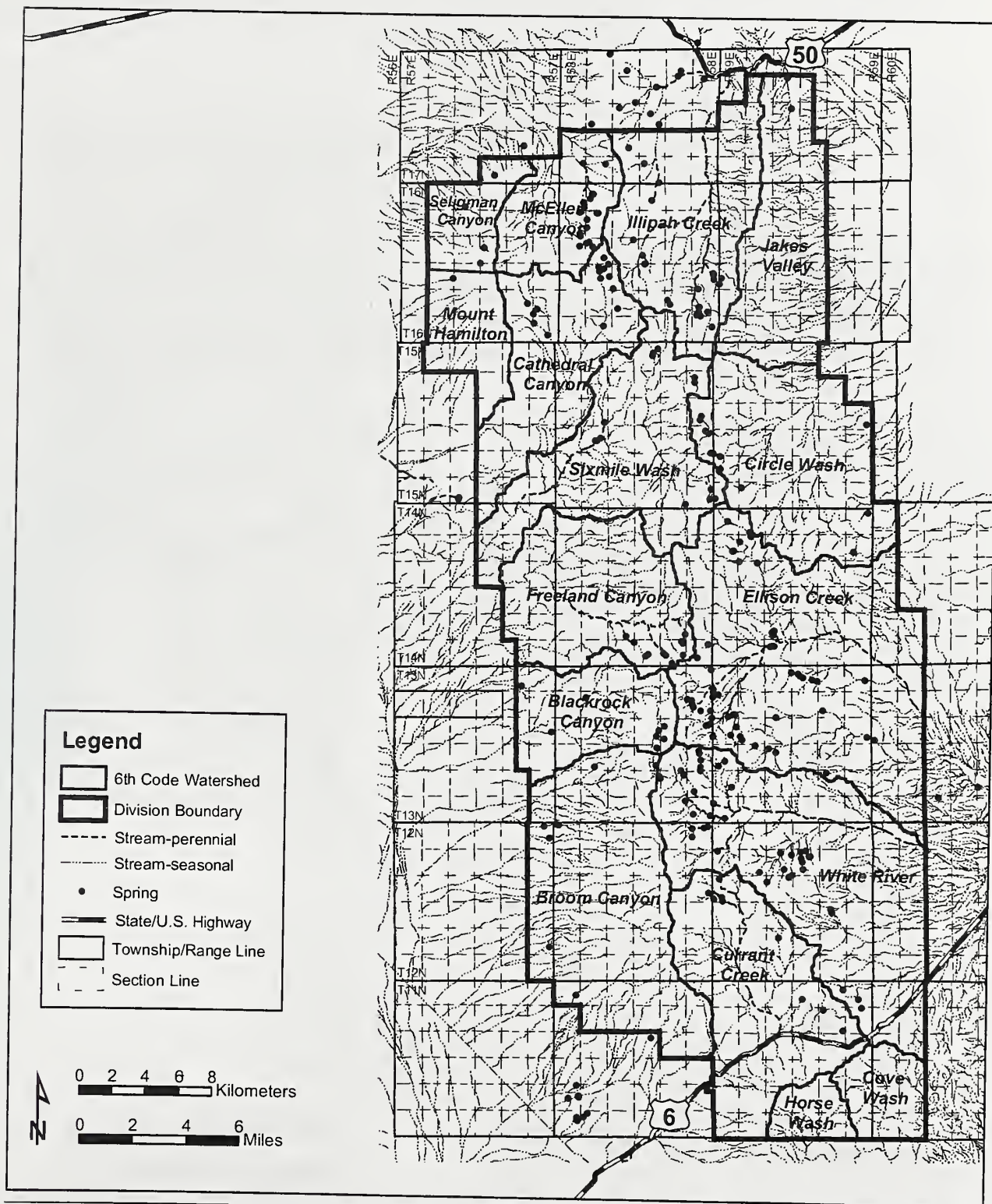
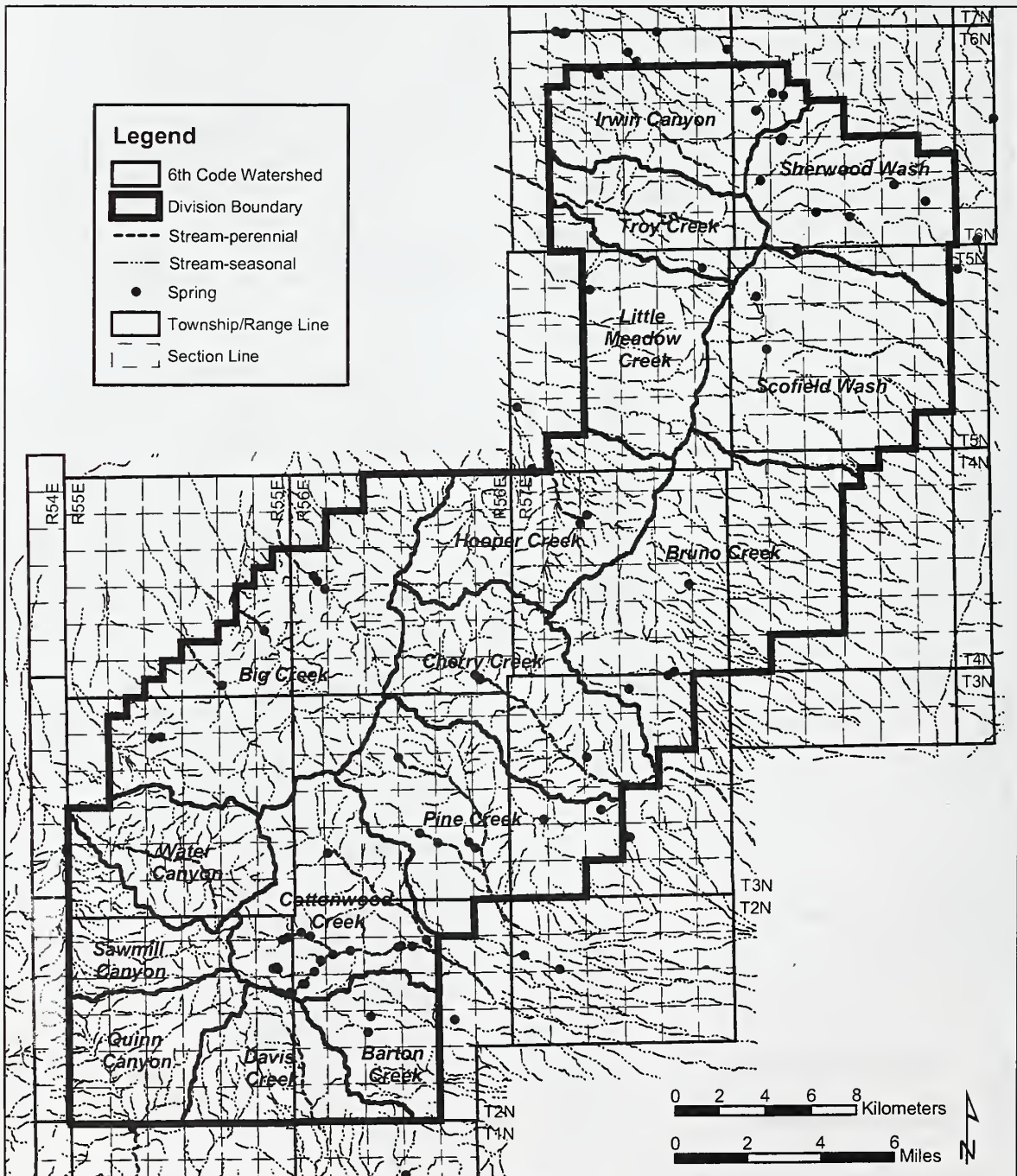


Figure 3-10: Grant-Quinn Division – Sixth Code Watersheds and Springs.

Streams vary in their sensitivity to disturbance and changes in discharge or sediment produced by their watershed. Low- to moderate-gradient streams with fine-textured channel and bank materials are most sensitive to disturbance (Rosgen 1996, page 8-9). These sensitive streams can be characterized by slope classes of 0 to 2 percent and 2 to 4 percent with clay, silt, sand or gravel bed and bank materials. GIS analysis of streams by slope class indicates that the sensitive stream types are located in the lower watersheds of Currant Creek, Ellison Creek, Illipah Creek, White River, Sixmile Wash, and Freeland Canyon in the White Pine Division; and Cherry Creek, Cottonwood Creek, Davis Creek, Pine Creek, and Water Canyon in the Grant-Quinn Division (Table 3-2 and Table 3-3).

Parameters relating to quality of water and aquatic habitat have been quantitatively measured in 7 out of the 32 watersheds within the Project Area. This information will serve as baseline data for the future analysis of site-specific project proposals for oil and gas exploration or development. However, an analysis of aquatic habitat and water quality conditions, which has not been completed yet, is required for site-specific project proposals.

Anecdotal observations suggest that many of the most sensitive stream segments listed above have been degraded to some extent by past land uses and watershed disturbance. Monitoring of Ellison Creek shows that water quality and aquatic habitat are currently degraded due to the cumulative effects of watershed disturbance from roads, vegetation conversions, wild horses, livestock grazing, and recreation. Forest Plan standards and guidelines for stream bank stability, water quality, and biotic condition index are not currently being met in Ellison Creek.

Table 3-2: Miles of Perennial Streams in 6th Code Watersheds by Slope Class within the White Pine Division

Slope Class (percent)	6th Code Watershed	Hydrologic Basin	Length (miles)	Total Length (miles)
0-2%	Currant Creek	Railroad Valley	1.3	24.4
	Ellison Creek	White River	8.5	
	Illipah Creek	Jakes Valley	6.9	
	Sixmile Wash	Railroad Valley	4.4	
	White River	White River	3.3	
2-4%	Currant Creek	Railroad Valley	7.2	31.7
	Ellison Creek	White River	6.3	
	Freeland Canyon	Railroad Valley	5.4	
	Illipah Creek	Jakes Valley	4.6	
	Sixmile Wash	Railroad Valley	2.0	
	White River	White River	6.2	
4-10%	Circle Wash	Jakes Valley	0.2	17.7
	Currant Creek	Railroad Valley	3.4	
	Ellison Creek	White River	1.1	
	Freeland Canyon	Railroad Valley	2.8	
	Illipah Creek	Jakes Valley	2.9	
	McEllen Canyon	Newark Valley	1.6	
	Sixmile Wash	Railroad Valley	0.2	
	White River	White River	5.4	
>10%	Currant Creek	Railroad Valley	0.5	1.8
	Ellison Creek	White River	0.2	
	Freeland Canyon	Railroad Valley	0.2	
	Illipah Creek	Jakes Valley	0.4	
	Sixmile Wash	Railroad Valley	0.1	
	White River	White River	0.4	
		TOTAL	75.5	

Table 3-3: Miles of Perennial Streams in Sixth Code Watersheds by Slope Class within the Grant-Quinn Division

Slope Class (percent)	6th Code Watershed	Hydrologic Basin	Length (miles)	Total Length (miles)
0-2%	Cherry Creek	Garden Valley	1.1	1.1
2-4%	Cherry Creek	Garden Valley	5.1	15.6
	Cottonwood Creek	Garden Valley	4.7	
	Davis Creek	Sand Spring Valley	0.6	
	Hooper Creek	Railroad Valley	0.6	
	Pine Creek	Garden Valley	3.6	
	Water Canyon	Railroad Valley	1.0	
4-10%	Big Creek	Railroad Valley	3.4	27.2
	Cherry Creek	Garden Valley	1.0	
	Cottonwood Creek	Garden Valley	6.8	
	Davis Creek	Sand Spring Valley	2.4	
	Hooper Creek	Railroad Valley	2.1	
	Irwin Canyon	Railroad Valley	0.2	
	Pine Creek	Garden Valley	3.9	
	Troy Creek	Railroad Valley	5.1	
	Water Canyon	Railroad Valley	2.3	
>10%	Cherry Creek	Garden Valley	0.3	4.3
	Cottonwood Creek	Garden Valley	0.4	
	Hooper Creek	Railroad Valley	0.1	
	Irwin Canyon	Railroad Valley	1.5	
	Pine Creek	Garden Valley	0.9	
	Troy Creek	Railroad Valley	0.4	
	Water Canyon	Railroad Valley	0.7	
TOTAL			48.1	

Riparian communities occur over a wide range of elevations along perennial and intermittent streams, in meadows, and along seeps and springs. Riparian ecosystems are extremely limited and valuable in the Project Area. In the arid Great Basin, the ecological role and importance of these riparian areas is greatly intensified.

Quaking aspen (*Populus tremuloides*) and narrowleaf cottonwood (*Populus angustifolia*) are most often the dominant forest types associated with riparian communities in the Project Area. Dominant riparian deciduous shrub species often include willows, dogwood, wild rose, wild cherry, sumac, and elderberry. Other associated shrubs may include serviceberry, snowberry, bitterbrush, and rabbitbrush. Grass species associated with wet meadows may include sedges, rushes, reedgrass, timothy, and bluegrass.

The *Intermountain Regional Assessment for Properly Functioning Condition of Riparian and Wetland Habitats* (June 3, 1996) states:

Riparian areas throughout the Region have been significantly affected over the past several decades. Most of these effects have been negative, including: lowering of water tables, erosion of

stream channels, exotic plant encroachment, concentrated runoff and increased sediment from road construction, and changes in vegetation composition.

The Assessment goes on to state that riparian areas are “the most important ecosystem component in the Region that is currently outside properly functioning condition,” and are at high risk for becoming non-functioning.

Anecdotal observations indicate that riparian and wetland ecosystems within the Project Area have been similarly impacted by past disturbance and use, and are at risk for becoming non-functioning. However, an analysis of riparian ecosystem conditions has not been completed for the Project Area. Completion of further analysis may be needed for site-specific project proposals for oil and gas exploration or development.

2.5.2. Forest Management Direction

Agency regulations (36 CFR 219.19) direct the Forest Service to address biological diversity where:

Management of habitat provides for the maintenance of viable populations of existing native and desired non-native, wildlife, fish, and plant species generally well distributed throughout their current geographic range. (*Forest Service Manual 2622.01*).

Agency management objectives direct the Forest Service to:

Protect soil productivity, water quality and quantity, and timing of water flows (*Forest Service Manual 2502*);

Protect, manage and improve riparian areas, in context of their unique values (*Forest Service Manual 2526*);

Give preferential consideration to riparian dependent resources when conflicts among use occur (*Forest Service Manual 2526*);

Minimize loss, destruction, and degradation of wetlands (*Forest Service Manual 2527*).

The Forest Plan contains objectives, standards, and guidelines to direct the management of aquatic and riparian habitats:

Management activities in riparian areas will be monitored and corrective action will be taken to prevent deterioration of riparian areas or degradation of water quality (page IV-49);

Do not allow construction of new roads, except for crossings, within riparian areas unless no other alternative exists (page IV-49);

Avoid development in 100-year flood plains unless it is the only practical alternative (page IV-49);

Maintain or improve the Biotic Condition Index (BCI) on 95 percent of the streams to a minimum standard of 85 BCI (page IV-49);

Strive to achieve and maintain at least 90 percent of the natural bank stability for streams supporting Bonneville cutthroat trout and 80 percent on all other streams (page IV-49).

2.5.3. Sensitive Resource Components

Due to their extremely limited extent and vital importance in supporting biodiversity, all riparian and aquatic habitats are considered to be sensitive resource components.

2.6. Vegetation Communities

2.6.1. General Description

Vegetation communities are vital for maintaining dependent wildlife populations. Plants play an important role in maintaining soil productivity and in regulating hydrologic function in watersheds. Uses in these areas include livestock grazing in sagebrush-grass communities, fuel wood harvesting in pinyon-juniper woodlands, and aesthetic appreciation of ancient bristlecone pine forests.

Habitat descriptions are often based on plant community assemblages (Clements 1961), because plants are at the base of the food chain (Lindemann 1942) and are often a major component in the description of a particular organism's niche (Hutchinson 1959). Community types often blend into one another, producing many unique combinations that may cross strict classification lines. The distribution of these community types is strongly influenced by a variety of forces including elevation, topography (slope and aspect), disturbance history, soil type and composition, and soil moisture. The interaction of these forces creates a mosaic across the landscape. Plant communities are dynamic and appear in a mosaic of varying successional stages at a given point in time (Clements 1916), especially in some of the more fire prone communities of the Great Basin.

Plant communities are mapped from satellite imagery for broad-scale analysis. For Nevada, vegetative cover types have been classified following GAP methodology, determined by the dominant species. For this analysis, the plant community types and cover types present in the analysis area have been grouped into eight communities based on dominant plant species and elevation zones. These communities include: alpine; Great Basin subalpine (white and douglas fir, limber and bristlecone pine); low sagebrush/grass; mountain mahogany; mountain sagebrush; mountain shrub; pinyon/juniper; and riparian-aspen. Critical and of special concern communities to be analyzed in this document are mountain mahogany, Great Basin sub-alpine, bristlecone, and riparian-aspen (Figures 3-11 and 3-12).

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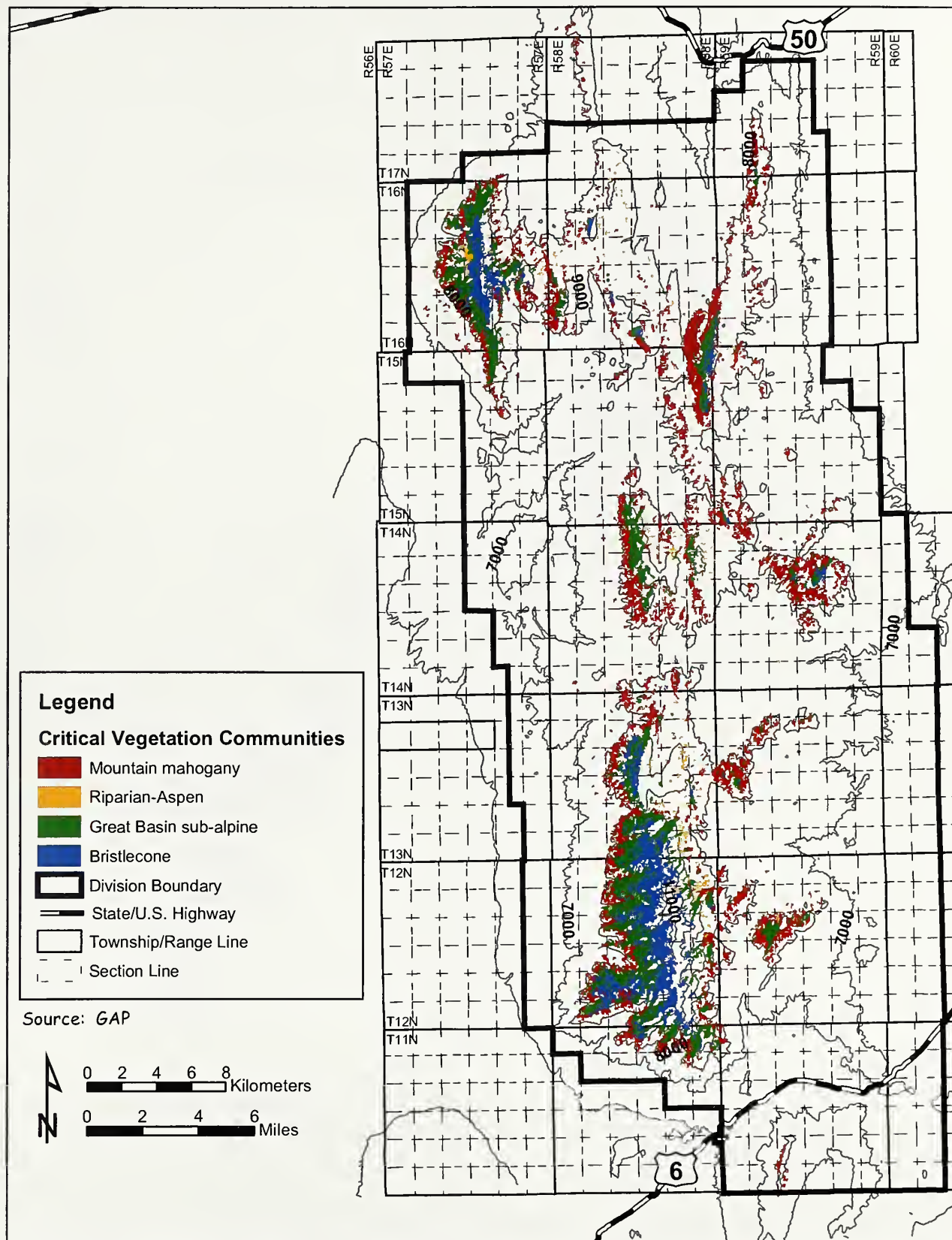
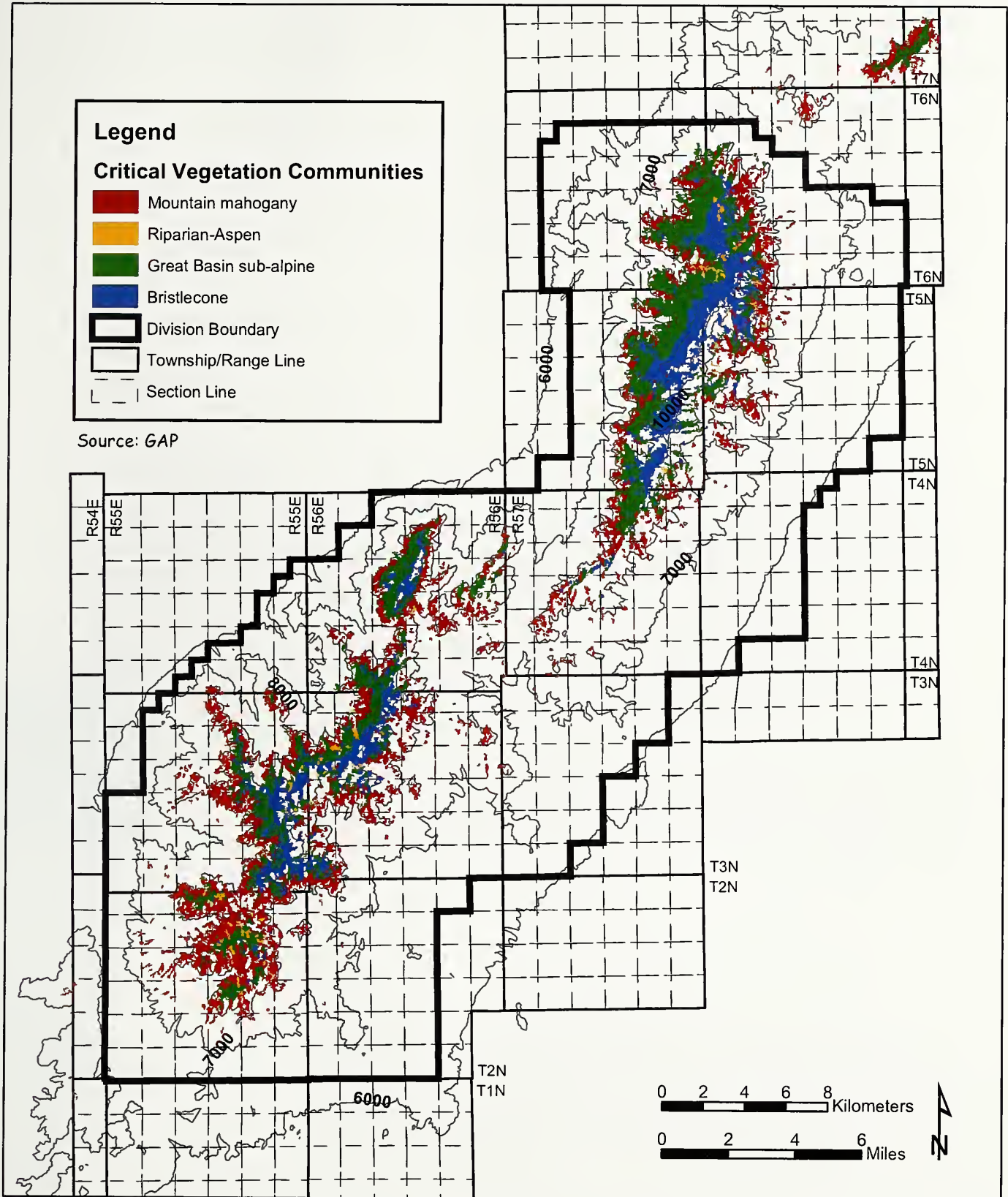
Figure 3-11: White Pine Division – Critical Vegetation Communities

Figure 3-12: Grant-Quinn Division – Critical Vegetation Communities

2.6.1.1. Alpine

1,663 acres: *White Pine Division*

848 acres: *Grant-Quinn Division*

The alpine community type usually occurs above 10,000 feet throughout Nevada. Vegetation is characterized by high elevation tundra that includes forbs, sedges, grasses, and shrubs. Principle forb species include alpine avens (*Geum rossii*), *Silene acaulis*, *Eriogonum* spp., *Draba* spp., *Penstemon* spp., and *Primula* spp. Grass species may include tufted hair grass (*Deschampsia caespitosa*), *Trisetum spicatum*, *Agropyron scribneri*, *Festuca ovina*, and alpine timothy (*Phleum alpinum*). Shrub species may include snowberry and willow. Even slight disturbance of alpine areas is significant, because recovery in this harsh environment is very slow. In the analysis area, most alpine areas occur in designated Wilderness.

2.6.1.2. Great Basin Sub-Alpine (includes Bristlecone Pine)

17,818 acres: *White Pine Division*

20,590 acres: *Grant-Quinn Division*

Sub-alpine communities in the analysis area are typically dominated by conifers, including white fir (*Abies concolor*), limber pine (*Pinus flexilis*), bristlecone pine (*Pinus aristata*), and whitebark pine (*Pinus albicaulis*). Other tree species that may be found in lesser numbers and/or in isolated patches in this area include Engelmann spruce (*Picea engelmannii*), Douglas fir (*Pseudotsuga menziesii*), and ponderosa pine (*Pinus ponderosa*). These forests are usually found at high elevations (9,500 to 11,000 feet), but may extend much lower on north-facing slopes and in steep, shady canyons where water is more abundant. Associated shrubs include snowberry and sagebrush species.

Bristlecone pine is the most critical sensitive resource in this cover type group. It is found at high elevations and includes the world's oldest trees, many of which exceed 3,000 years (Hamilton 1993). These old growth stands of gnarled, weather-beaten trees are usually even-aged and open, and are very aesthetically pleasing.

Other species in the Project Area's sub-alpine conifer group are rare in Nevada. Engelmann spruce is known from only four mountain ranges in all of Nevada (Charlet 1996). Spruce and sub-alpine fir forests provide habitat for many late-seral, forest-dependent animal and bird species. Ponderosa pine occurs in a only a few places in the Project Area and is found only in the Grant, Schell, and Snake Ranges in Nevada (Trimble 1989).

2.6.1.3. Low Sagebrush / Grass

57,921 acres: *White Pine Division*

35,903 acres: *Grant-Quinn Division*

These shrublands are typically found at lower elevations within the Project Area and are principally dominated by mountain big sagebrush (*Artemisia tridentata*) spp., black sagebrush (*Artemisia nova*), or low sagebrush (*Artemisia arbuscula*). Associated shrub species may include rabbitbrush (*Chrysothamnus* spp.), shadscale (*Atriplex confertifolia*), and Mormon tea (*Ephedra* spp.). Associated grass species may include wheatgrass (*Agropyron* spp.), cheatgrass (*Bromus tectorum*), bluegrasses (*Poa* spp.), and needlegrasses (*Stipa* spp.).

2.6.1.4. Mountain Mahogany

14,971 acres: *White Pine Division*

13,966 acres: *Grant-Quinn Division*

This is a mid-elevation woodland that is dominated principally by mountain mahogany. Associated species may include pinyon pine, juniper, and sagebrush species. Mountain mahogany is most abundant in central eastern and northern Nevada, usually found at elevations above the pinyon-juniper zone on steep, rocky, dry slopes.

Curl-leaf mountain mahogany is evergreen, has a tree-like form, and has a number of disease pathogens. It is often found on calcareous substrates, but may grow on other substrates as well. Because it does not re-sprout after burning and reproduces only by seed, it does not regenerate well, especially after wildfires. Use by large ungulates such as elk, deer, and bighorn sheep is high. Mountain mahogany stands on south and west slopes provide nutritious forage and important winter range.

2.6.1.5. Mountain Sagebrush

58,488 acres: *White Pine Division*

13,979 acres: *Grant-Quinn Division*

This is a mid-elevation, mountain shrubland that is dominated or co-dominated by mountain big sagebrush, low sagebrush, and silver sagebrush (*Artemisia cana*); along with mountain shrubs, grasses, and forbs. Associated tree species may include pinyon pine, Utah juniper, mountain mahogany, aspen (*Populus tremuloides*), white fir (*Abies concolor*), and limber pine (*Pinus flexilis*).

2.6.1.6. Mountain Shrub

18,081 acres: *White Pine Division*

1,901 acres: *Grant-Quinn Division*

These deciduous shrublands are typically found in the foothills and mountains. They are dominated or co-dominated by oak (*Quercus* spp.), maple (*Acer* spp), cliffrose (*Cowania mexicana*), bitterbrush (*Purshia tridentate*), serviceberry (*Amelanchier* spp.), sagebrush, and rabbitbrush. Primary associated tree species include pinyon pine (*Pinus monophylla*), juniper (*Juniperus osteosperma*), mountain mahogany (*Cercocarpus ledifolius*), aspen (*Populus tremuloides*), white fir (*Abies concolor*), and limber pine (*Pinus flexilis*).

2.6.1.7. Pinyon/Juniper

173,704 acres: *White Pine Division*

131,337 acres: *Grant-Quinn Division*

These conifer woodlands, common throughout the Project Area at low- to mid-elevations, are principally dominated by single leaf pinyon pine (*Pinus monophylla*) and Utah juniper (*Juniperus osteosperma*). Although the elevational range of these two species largely overlaps, they often separate spontaneously with pure stands of juniper at lower elevations and pure stands of pinyon pine at higher elevations. Associated species may include curlleaf mountain mahogany (*Cercocarpus ledifolius*), sagebrush, rabbitbrush, and cliffrose (*Cowania mexicana*).

2.6.1.8. Riparian – Aspen

1,152 acres: *White Pine Division*

789 acres: *Grant-Quinn Division*

Riparian communities occur over a wide range of elevational zones along perennial and intermittent streams, in meadows, and along seeps and springs. Riparian ecosystems are extremely limited and valuable in the Project Area. In the White Pine Division there are only four perennial streams: Ellison Creek, Illipah Creek, Currant Creek, and White River. In the Grant-Quinn Division, there are seven perennial streams: Troy Creek, Cherry Creek, Deep Creek, Pine Creek, Big Creek, Willow Creek, and portions of Cottonwood Creek. In the arid Great Basin, the ecological role and importance of these riparian areas is greatly intensified. Riparian areas are discussed in greater detail in the “Aquatic and Riparian” section of this document.

Quaking aspen (*Populus tremuloides*) and narrowleaf cottonwood (*Populus angustifolia*) are often the dominant forest types associated with riparian communities in the Project Area. There are 830 acres of aspen/cottonwood in the White Pine Division and 527 in the Grant-Quinn Division. Aspen and cottonwood, limited in the Project Area, are one of the most valuable habitat types for use by nesting songbirds, raptors, and big game. Aspen also maintains watershed condition, enhances soil productivity, and is aesthetically pleasing. Most stands are old, decadent, and approaching the end of their life cycle in the Project Area, probably due to fire exclusion and grazing by wild and domestic ungulates.

Other dominant or co-dominant tree species in the riparian zones may include pinyon pine, mountain mahogany, limber pine, white fir, ponderosa pine, whitebark pine (*Pinus albicaulis*), and water birch (*Betula occidentalis*). Dominant shrub species often include willow (*Salix* spp.), dogwood (*Cornus* spp.), wild rose (*Rosa woodsii*), wild cherry (*Prunus* spp.) and sumac (*Rhus* spp.). Other associated shrub species may include those found in the above mentioned mountain shrub community. Plant species associated with wet meadows may include sedges (*Carex* spp.), rushes (*Juncus* spp.), reedgrass (*Calamagrostis* spp.), timothy (*Phleum* spp.), and bluegrass (*Poa* spp.).

2.6.2. Forest Management Direction

Agency management goals and objectives direct the Forest Service to:

- Not cut in the mountain mahogany, aspen, cottonwood, white-fir and mixed conifer until after August 1st of each year to protect nesting wildlife. (page IV-184)
- Protect bristlecone pine including remnants from destruction or removal authorized by persons. (page IV-184)
- Authorize the disturbance of bristlecone pine sites only with written permission of the Forest Supervisor. (page IV-184)

There is current direction for “moist” areas, which are described in the Aquatic and Riparian section of this document. Although there is no specific direction for aspen stands, most (but not all) aspen stands in the analysis area occur in riparian areas and so will be covered by *Forest Plan* direction.

2.6.3. Sensitive Resource Components

Great Basin subalpine, bristlecone, mountain mahogany, and riparian-aspen vegetative communities are considered sensitive resource components due to their rare occurrence within the project area, sensitivity to disturbance, importance to wildlife, or aesthetic value.

2.7. Noxious Weeds

2.7.1. General Description

Noxious weeds and other invasive species are a serious concern in the Project Area. Data from a 2002 weed inventory shows there are six known noxious weed species present in the Project Area: Scotch thistle (*Onopordum acanthium*), Russian knapweed (*Centaurea repens*), white top (*Cardaria draba*), Canada thistle (*Cirsium arvense*), musk thistle (*Carduus nutans*), and bull thistle (*Cirsium vulgare*). Most of the noxious weed sites are located along roads, creeks, and where the ground has been disturbed. Ellison Basin, Copper and Currant Creeks, Belmont Mill, and White Pine Mining District have the majority of the inventoried weeds.

These species often invade after ground-disturbing activities, especially in susceptible habitats. Weed seeds can be carried along on people, animals, unwashed vehicles, and equipment. Unless managed properly, noxious weeds and other invasive exotic species can have great negative effects on ecosystem structure and function. As exotic or weedy species invade and establish, the number and cover of native plant species is reduced, erosion rates can increase, wildlife forage and bird habitat is reduced, and ecological processes such as fire behavior may be altered. In Wilderness and other recreational areas, noxious weeds and other exotics are an unsightly reminder of human intervention in the ecosystems.

2.7.2. Forest Management Direction

Agency management goals and objectives direct the Forest Service to:

- Cooperate with counties and others in controlling noxious weeds and poisonous plants (*Forest Plan*, page IV-37).
- The S&Gs for noxious weed control give direction to “incorporate noxious weed control into mineral operating plans and allotment management plans” (*Forest Plan*, page IV-38).
- *Forest Service Manual 2000 – National Forest Resource Management, Chapter 2080 – Noxious Weed Management, Supplement Number 2000-2004-1* establishes Forest policy for noxious weed procedures for Forest program areas.

2.7.3. Sensitive Resource Components

There are no sensitive resource components to address in this analysis for noxious weeds. Mitigation direction is provided in *Forest Service Manual, Humboldt-Toiyabe National Forest (R4), Sparks, NV, FSM 2000 – National Forest Resource Management, Chapter 2080 – Noxious Weed Management, Supplement No.: 200-2004-1*. Therefore, Standard Lease Terms provides for this management direction to be followed in all leasing activities.

3. GEOLOGY, SOILS, GROUNDWATER, AND AIR QUALITY

3.1. Geology and Soils

Geologic materials and soils form the foundation for ecosystems, provide primary productivity in supporting plant growth, and regulate hydrologic function of watersheds by storing and releasing water from precipitation or snowmelt.

3.1.1. General Description

3.1.1.1. Climate

Soil formation and erosion potential is influenced by the area climate. The basin floor and piedmont slopes experience hot summers, cold winters, and light precipitation. At the higher elevations precipitation is greater and primarily accumulates as snow. Annual precipitation on the piedmont slope ranges from 7 to 10 inches. Mountain precipitation increases with elevation and ranges from 12 to 25 inches per year. Mean monthly precipitation is lowest for July, August, and September; it is highest for January, February, and April (National Climatic Data Center 1999). Based on the Ely, Nevada, weather data, the maximum 1-day precipitation for the Project Area for the period of 1948 to 1998 was about 2.6 inches, and the maximum 3-day rainfall was about 3.51 inches (National Climatic Data Center 1999). Rainfall capable of causing surface erosion and gully formation can occur during any season. Weather patterns vary across the State, and Ely data may be somewhat different than at the extremes of the Project Area.

3.1.1.2. Geology

The White Pine and Grant-Quinn ranges are located in the central portion of the Great Basin that comprises the northern half of the Basin and Range Physiographic Province. The Basin and Range Province consists of a series of long and narrow, north-south trending mountain ranges alternating with broad basins.

The White Pine Range consists of a core area of Middle Cambrian to Devonian (540 to 370 million years old) carbonate and other sedimentary rocks trending north-south along the western side of the range (Price et al. 1999; Turner et al. 1991; Hose and Blake 1976). Upper-Paleozoic (290 to 345 million years old) carbonate rocks occur in the northern and southeast portions of the range. Volcanic rocks of Oligocene age (20 to 40 million years old) occur along the northwest, southwest, and eastern parts of the range.

The Grant-Quinn ranges consist of Late Proterozoic (750 million years old) to lower Paleozoic (435 to 570 million years old) carbonate and other sedimentary rocks in the northern part of the range. Oligocene age (30 million years old) volcanic rocks occur in the southern half of the range. The White Pine and Grant-Quinn ranges are surrounded by Quaternary (1.8 million to 12,000 years old) to recent alluvial and lake sediments.

Late Miocene (30 to 40 million years ago) tectonics formed the north-south trending fault-block mountain ranges and flat-bottomed valleys of the Basin and Range Physiographic Province. The White Pine and Grant-Quinn ranges are bounded by faults and contain hundreds of faults in the hill and mountain areas (Hose and Blake 1976; Stewart and Carlson 1977). Late Quaternary faulting (within the last 500,000 years) has been documented throughout the region (Thenhaus and Wentworth 1982). All historic earthquakes in the Basin and Range Province of magnitude 6.3 or larger have produced surface features (Thenhaus and Wentworth 1982).

3.1.2. Landforms and Soils

Primary landform types in the White Pine and Grant-Quinn areas include hills and mountains, the piedmont slope, floodplains and terraces, and the basin floor (Blackburn 1998). Soils in the White Pine and Grant-Quinn areas are closely associated with these primary landform types. The hill and mountain regions rise 1,000 to 6,000 feet above the surrounding piedmont slope and comprise about half of the Project Area. The piedmont slope borders the mountain areas and is comprised of alluvial deposits

transported from the mountains over many thousands of years. Basin floor landforms lie at the lower portions of the main intermountain valleys and consist of stream, lake, and wind deposits.

Although soil maps have not been developed for National Forest lands in the White Pine and Grant-Quinn Divisions, a soil survey of the area surrounding the White Pine Division provides detailed soil descriptions that include the same landforms and soil types found in the Project Areas (Blackburn 1998).

3.1.2.1. Soils on Hills and Mountains

Hills and mountains range in elevation from 6,000 to 11,000 feet. Hill and mountainous terrain occupies about 60 percent of the White Pine Division and 40 percent of the Grant-Quinn Division. Approximately 284,962 acres (50 percent) of the Project Area occurs in this group. The hill and mountain soils are on steep (25 to 40 percent) to very steep (greater than 40 percent) slopes. The soils depths range from very shallow (less than 10 inches) to very deep (more than 60 inches) depending on location. Soil textures vary depending on parent material. The soils, formed from bedrock and loose rock deposits and most are on stable geomorphic surfaces, have a minor organic surface layer and an accumulation of lime or clay in the subsoil. Some of the soils are on unstable geomorphic surfaces and are eroding as rapidly as they form.

Mass wasting is not a dominant process in the Project Area. However, rockfall, shallow landslides, deep-seated landslides, and debris flows may be potential hazards to roads and other facilities in the hill and mountain portions of the Project Area. In very steep terrain (greater than 40 percent slope), cut and fill slopes for roads and well pads may be vulnerable to slope failure and related surface erosion because of their excessive heights and slopes.

Almost all of the forested land in the Project Area occurs in the hill and mountain areas. Forested areas have a sparse understory and are vulnerable to erosion if the trees are removed. Water and wind erosion hazard is minimal for undisturbed soils. When disturbed, these soils are subject to erosion. Special construction methods and erosion control best management practices may be needed to prevent excessive soil loss in the hill and mountain areas.

3.1.2.2. Soils on Piedmont Slopes

The piedmont slopes range in elevation from 5,400 to 7,800 feet; terrain includes about 40 percent of the White Pine Division and 60 percent of the Grant-Quinn Division. Approximately 284,948 acres (50 percent) of the Project Area occurs in this group. These soils are on nearly level (0 to 2 percent) to steep (25 to 40 percent) slopes. The soils range from shallow (10 to 20 inches) to moderate (20 to 40 inches) depths over a duripan (subsurface layer of silica and lime cementation) or are shallow to very deep when no duripan is present. These soils are moderately coarse textured to very gravelly in the surface layer and fine textured in the subsoil and are well-drained with medium runoff. Many of the soils exhibit duripan layers in the substratum, and some have an accumulation of clay in the subsoil. These soils formed in alluvium and are generally on stable geomorphic surfaces. They can be subject to flooding on active alluvial fans. In undisturbed sites, these soils have a slight erosion hazard due to protective cover from vegetation and surface gravel, but have a high erosion hazard in disturbed areas.

3.1.2.3. Soils on Floodplains and Terraces

Floodplains and terraces range in elevation from 5,200 to 6,700 feet. They occur along the margins of all stream channels. There are about 1,338 miles of channels in the White Pine Division and 828 miles in the Grant-Quinn Division. Average floodplain and terrace width is 300 feet. Seeps, springs, and channels have narrow riparian vegetation zones where moisture is available for most of the growing season. These

riparian zones are important in the Project Area because of their rarity in the region and their importance to plants and wildlife. They provide stability to stream banks and soils, and erosion and water quality impacts can occur if damaged.

The soils on floodplains and terraces are on 0 to 8 percent slopes. Most of these soils have a seasonal high water table, and some areas are subject to flooding for brief periods from March through June. These soils are formed in alluvium. Flood plain soils are relatively young and exhibit little, if any, profile development. Some of the terrace soils occur on older geomorphic surfaces and exhibit a moderate degree of soil development. Floodplain and terrace soils have fine to moderately coarse textured surface and subsurface layers. Soil depth can range from moderately deep over a duripan to very deep elsewhere. The soils are well to poorly drained, and runoff is slow for most floodplain and terrace soils.

Erosion hazard is minimal for undisturbed soils on terraces. Terrace soils subject to disturbance may have moderate to high erosion hazard rating. Flood plain soils subject to disturbance may erode and result in sedimentation in the stream.

3.1.2.4. Soils on the Basin Floor

The basin floor elevation ranges from 5,800 to 6,400 feet. Basin floor soils do not occur within the Project Area; however, existing and potential lease-related access roads to the Project Area may cross basin floor soil types. The basin floor slopes are 0 to 4 percent. These soils were formed from lake sediments, alluvium over lake sediments, and wind blown clay, silts, and sands. Basin floor soils on more recent deposits are poorly developed. Soils formed on slightly older geomorphic surfaces exhibit minimal soil development. Some of the basin floor soils have a seasonally high water table, and they are subject to occasional flooding. Basin floor soils are very deep and fine to moderately coarse textured throughout the profile. Runoff is very slow to slow for most basin soils. Water and wind erosion hazard is minimal for undisturbed soils and moderate to high for disturbed areas. Dust abatement and all-season surfacing treatments may need to be considered for roads in this area.

3.1.2.5. Soil Erosion Hazards

Nineteen percent of the White Pine Division has a Very-High soil erosion hazard (greater than 40 percent slope), 24 percent High soil erosion hazard (25 to 40 percent slope), 37 percent Moderate soil erosion hazard (10 to 25 percent slope), and 21 percent Low soil erosion hazard (0 to 10 percent slope) (Table 3-4, Figure 3-13, and 3-14). About 38 percent of the Grant-Quinn Division has a Very-High soil erosion hazard, 23 percent High soil erosion hazard, 22 percent Moderate soil erosion hazard, and 16 percent Low soils erosion hazard.

The Very-High soil erosion hazard areas total 150,986 acres in the Project Area. These very steep slopes are located in the hill and mountainous areas. The Very-High soil erosion hazard zone includes areas where soil erosion and mass wasting is naturally occurring and where surface disturbance would lead to ongoing erosion or increased mass wasting potential. Roads constructed in this zone are generally engineered where all of the excavated material is used to construct the road fill and surface. This type of construction may include drainage and slope stability structures that are costly to build, maintain, and close.

The "Revised Universal Soil Loss Equation" is an erosion model used to estimate average rates of soil loss by the dominant erosion process in the Project Area, which are sheetwash and rill erosion (Renard et al. 1997). Based on the Revised Universal Soil Loss Equation, hill and mountainous slopes in the Project Area would erode between 0.1 and 2.6 inches per year from sheetwash and rill erosion when disturbed. The hill and mountain soils are also vulnerable to modified surface water drainage from surface

Table 3-5: Roads in the White Pine & Grant-Quinn Divisions, Humboldt-Toiyabe National Forest.

Road Type	Road Length (miles)			
	White Pine	Grant-Quinn	Total	Percent
Primary Highway	9	0	9	1.5%
Improved Dirt	65	2	67	11%
Unimproved Dirt	301	125	426	68%
Unimproved - 4WD	92	30	123	20%
Unclassified	3	0	3	0.5%
TOTAL	471	157	628	100%

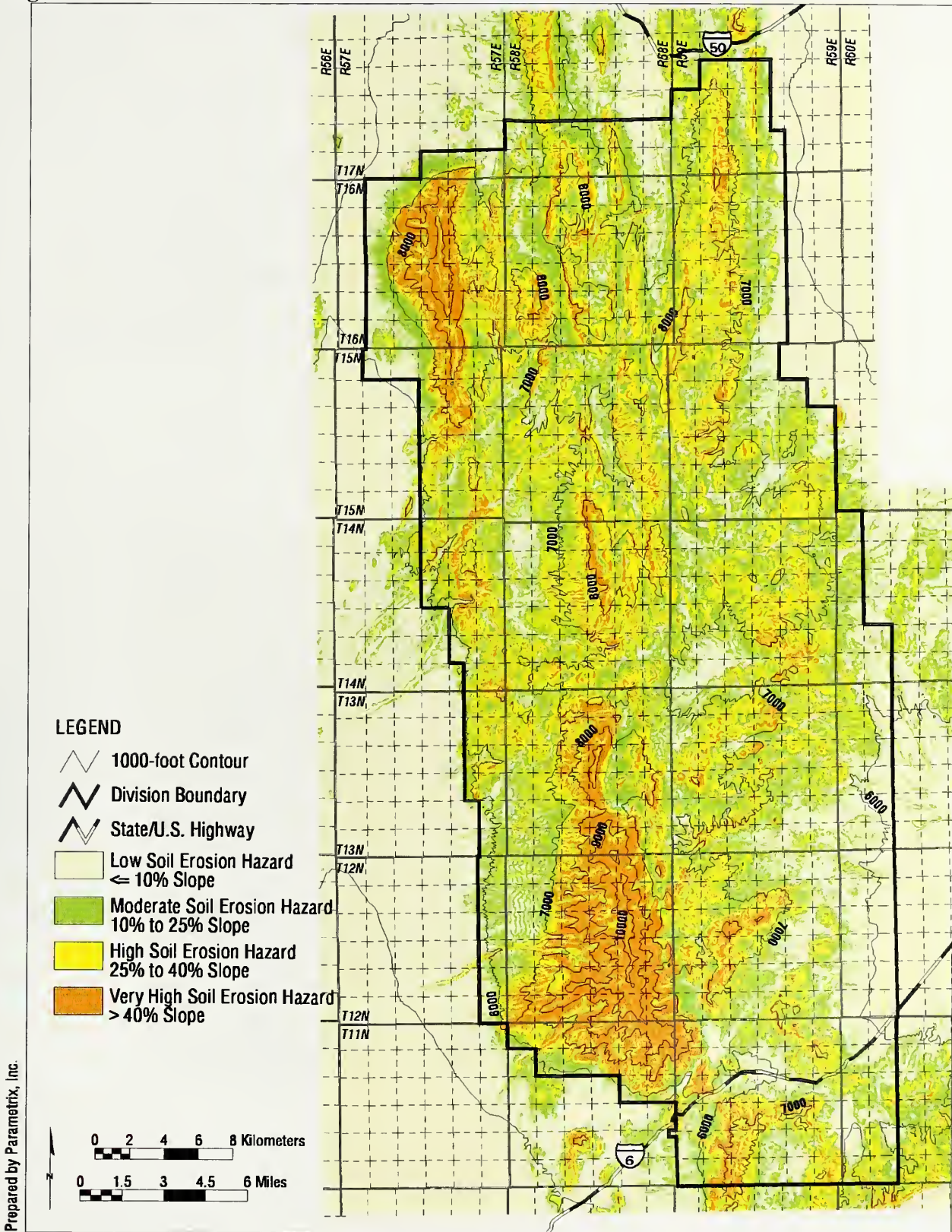
Figure 3-13: White Pine Division – Soil Erosion Hazard Areas

Figure 3-14: Grant-Quinn Division – Soil Erosion Hazard Areas

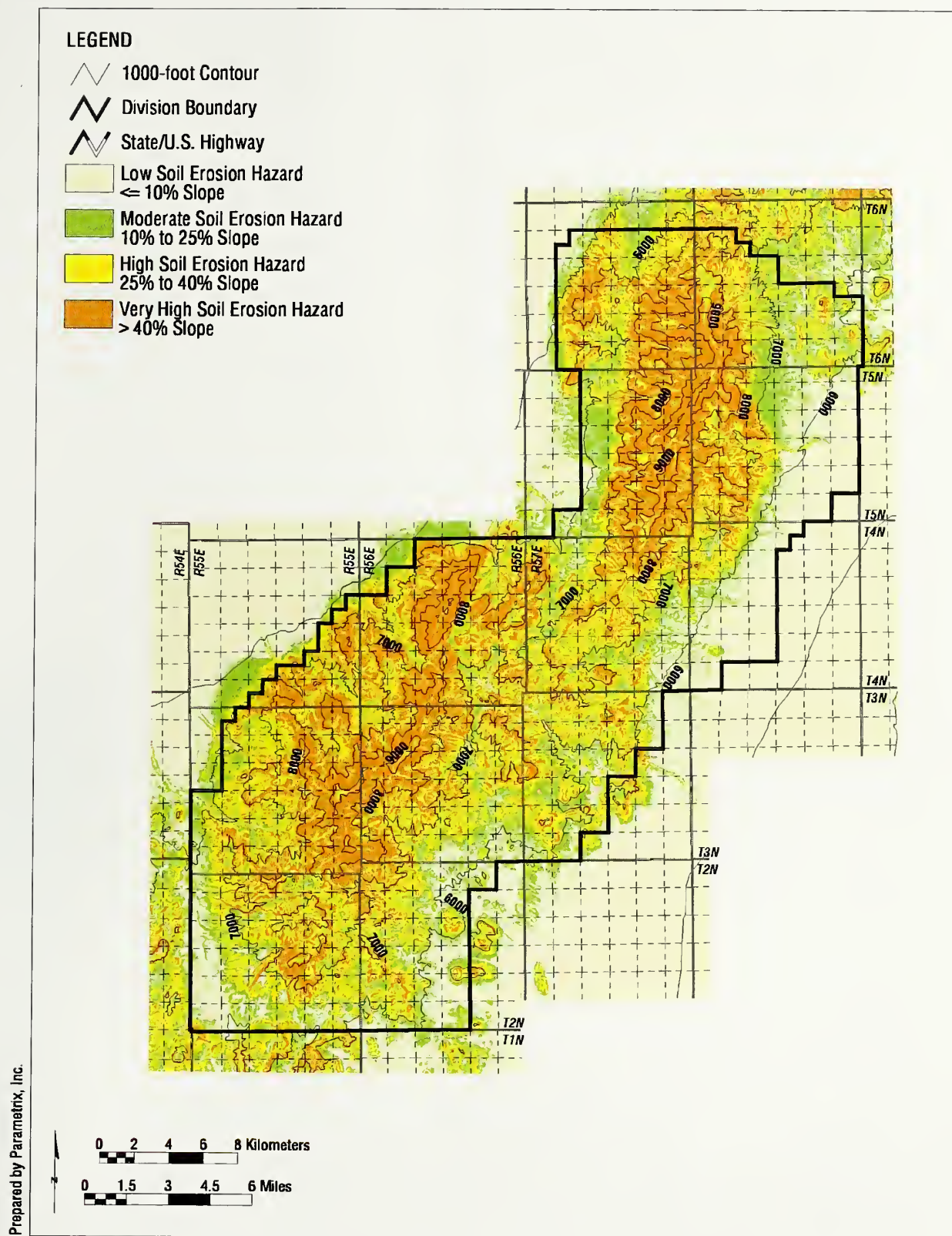
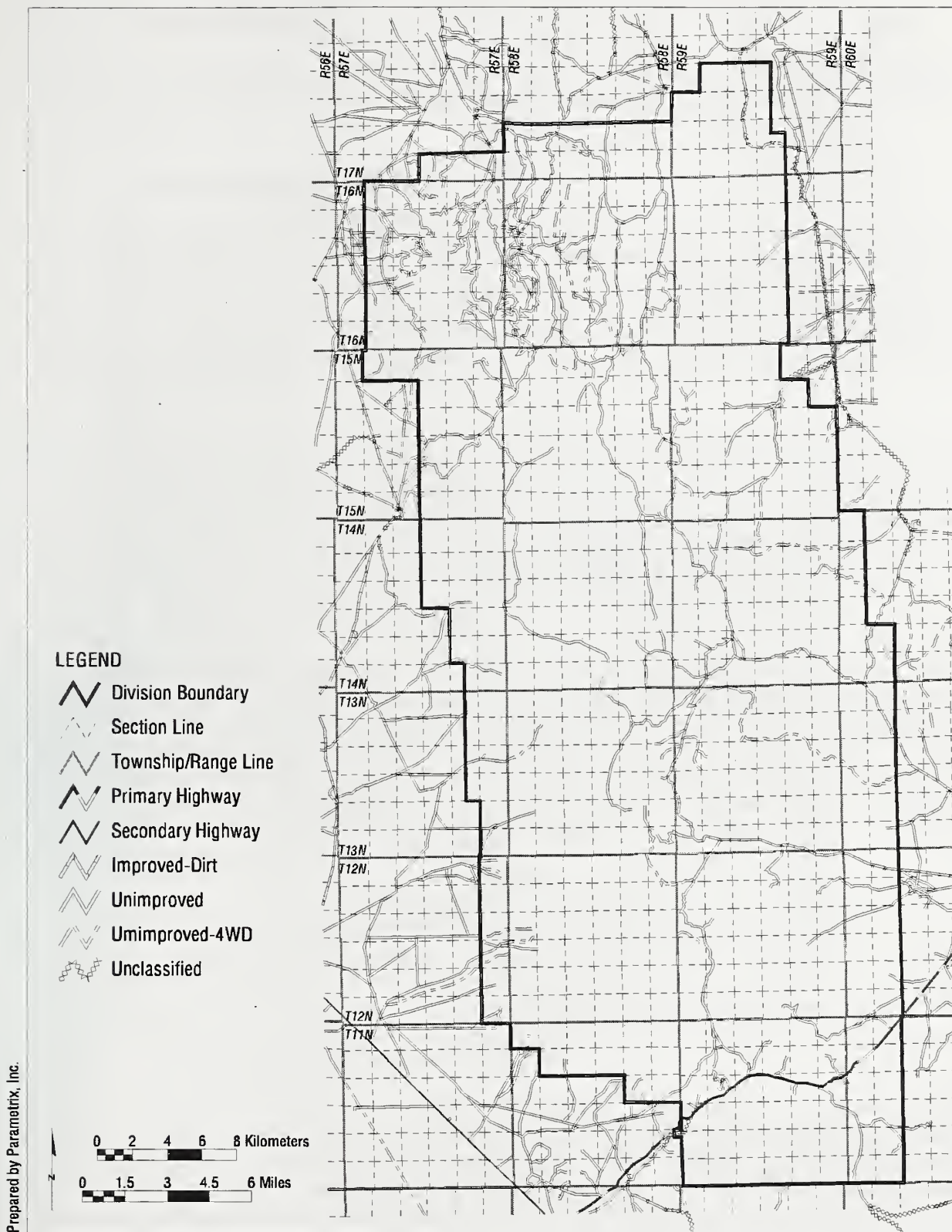
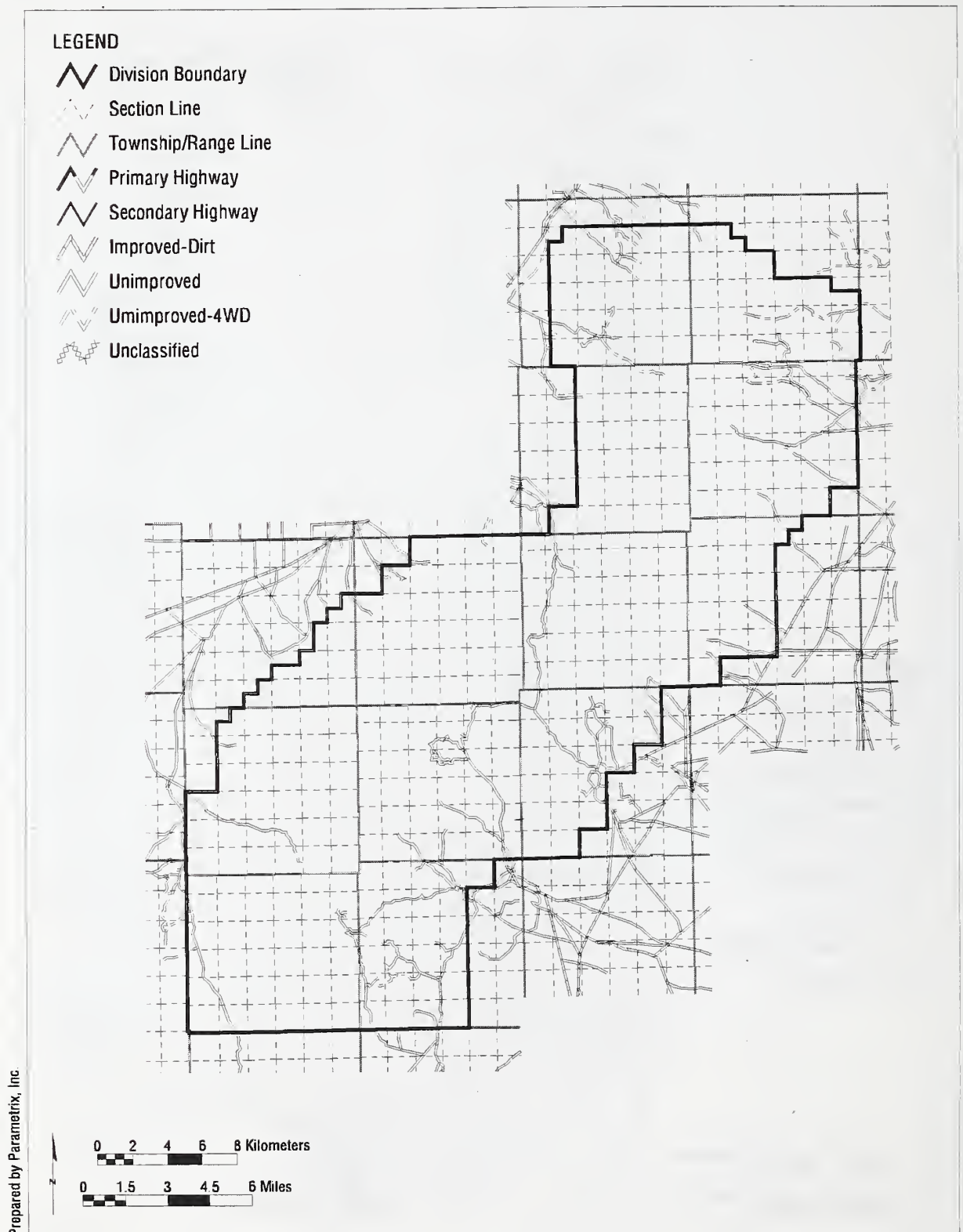


Figure 3-15: White Pine Division – Existing Roads



Prepared by Parametrix, Inc.

Figure 3-16: Grant-Quinn Division – Existing Roads



3.2. Groundwater

3.2.1. General Description

Groundwater contributes to maintaining base flow for streams and springs and to maintaining riparian ecosystems. Humans derive benefit from groundwater uses, such as drinking water, irrigation, industry, and recreation.

3.2.1.1. Regional Hydrogeology

The Project Area is located within the Great Basin, a physiographic area of the western United States that is characterized by north-south trending mountain ranges and intervening basins that were formed during the Cenozoic Period by large-scale faulting. Plume and Carlton (1988) grouped the rocks of the Great Basin into 12 hydrogeologic units based on lithology, areal extent, and estimated hydrologic properties. These units have been grouped into three functional categories by Harrill et al. (1988): basin-fill with moderate to high permeability; consolidated rocks with moderate to high permeability; and consolidated rocks with low permeability.

The consolidated rocks with moderate to high permeability are primarily carbonate rocks (limestone and dolomite) that underlie a large area of western Utah and eastern Nevada known as the Carbonate Rock Province (Harrill et al. 1988). The Project Area is located within the Carbonate Rock Province, which is characterized by complex interbasin regional flow systems (aquifers in basin-fill deposits and carbonate rocks) bounded by faulted low-permeability consolidated rocks. The carbonate rock aquifers extend beneath mountain ranges and conduct groundwater flow between basins (Thomas et al. 1986).

3.2.1.2. Project Area Hydrogeology

Groundwater in the Project Area occurs in the basin-fill deposits, carbonate rocks, and non-carbonate rocks (see Figure 3-17). The carbonate and non-carbonate rocks form the mountain masses and underlie the basin-fill deposits. The mountain ranges that form a roughly north-south spine along the centerline of the Project Area are bounded by basin-fill deposits of the following adjacent valleys: Northern and Southern Railroad Valleys on the west and Jakes, White River, Sand Springs and Garden Valleys on the east. The majority of the land encompassed within the Project Area is mountainous and underlain by carbonate and non-carbonate rocks. There are limited areas of basin-fill deposits along the Project Area boundaries where the valleys border the mountains.

The basin-fill deposits are comprised of younger and older deposits (Plume and Carlton 1988). The younger basin-fill deposits underlie the valley floors and surrounding alluvial slopes. Sand and gravel lenses within these deposits commonly yield water readily to wells. Older basin-fill deposits are covered in the lowest parts of the valley floors by as much as a few hundred feet of younger basin-fill deposits. The older deposits are generally more consolidated and less permeable than the younger deposits. Playa areas and associated lakebed deposits in the valley floors are composed of silt and clay, and are poor sources of groundwater (Van Denburgh and Rush 1973).

The carbonate rocks are dominated by limestone and have high permeability due to fractures and solution channels (Van Denburgh and Rush 1973). Fresh groundwater was encountered in cavernous limestone at depths approaching 4,100 feet below ground surface in the Hayden Creek oil test in Jakes Valley, as well as in deep mine shafts in the northeastern White River Valley (Eakin 1966). The non-carbonate rocks are dominated by volcanic tuff, with lesser amounts of other volcanics, quartzite, shale, and granitic intrusives (Van Denburgh and Rush 1973).

3.2.2. Groundwater Occurrence and Movement

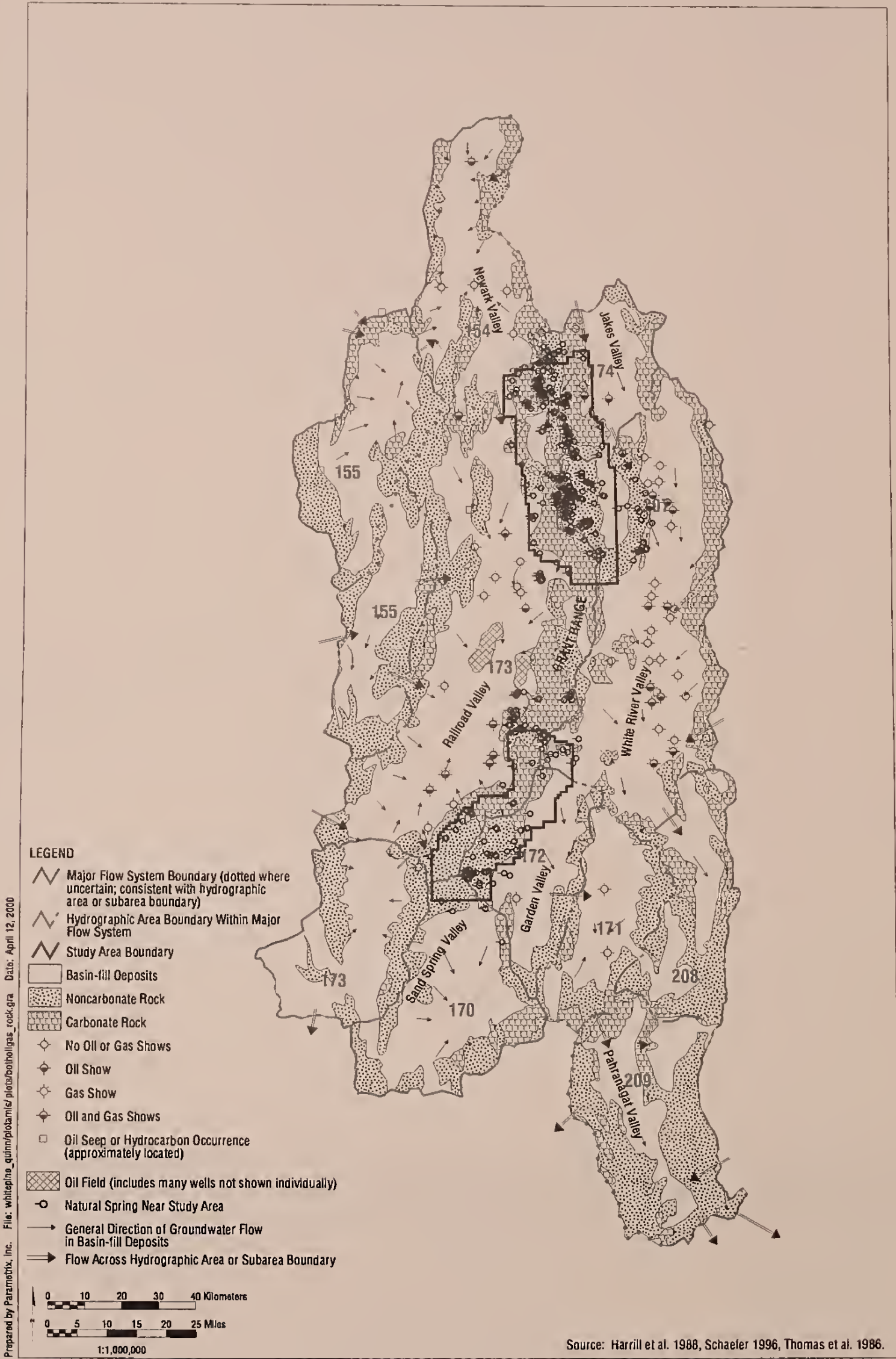
Groundwater in the Project Area is recharged from local precipitation that averages 5 inches per year at low altitudes and 25 inches per year in the mountains. The precipitation is snow and rain from generally eastward-moving storms during the winter and from thunderstorms associated with northward air movements in late spring and summer (Van Denburgh and Rush 1973). Groundwater moves from recharge areas in the mountains and adjacent alluvial slopes toward the valleys, and is discharged at land surface as springs and creeks. It can also be utilized by plant roots and subsequently transpired to the atmosphere and pumped from wells and springs for water supply use. Groundwater can also migrate into deeper, permeable basin-fill deposits and carbonate rocks through which it can flow into adjacent valleys.

Major springs that occur in the Railroad and White River Valleys adjacent to the Project Area are listed in Table 3-6 and shown on Figure 3-17. With an estimated discharge of 13 cubic feet per second, Big Warm Springs at Duckwater is the second largest spring in Nevada. Discharges from these major springs are probably associated with permeable carbonate rocks (Van Denburgh and Rush 1973). Minor springs occur throughout the Project Area, discharging from rock formations on the mountain slopes and in the basin-fill deposits (see Figure 3-17). Most of the springs within and adjacent to the Project Area receive recharge from precipitation that falls within the Project Area and, therefore, have the potential to be impacted by land use activities.

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Figure 3-17: Groundwater Features of the Project Area



Groundwater in the basin-fill deposits generally flows from the mountain highlands toward the adjacent valleys (as illustrated by the single arrows on Figure 3-17). Shallow groundwater that flows into Northern Railroad Valley, a topographically closed basin, does not leave the basin and eventually evaporates from the soil surface or is transpired through plants. Northern Railroad Valley also receives groundwater inflow from adjacent basins, as shown by the double arrows. This groundwater eventually discharges as springs in the valley. A minor amount of groundwater is believed to flow out of Southern Railroad Valley to the south into the Kawich Valley (Van Denburgh and Rush 1973).

Jakes, White River, Garden, and Coal Valleys are part of an interconnected series of valleys that are associated with the White River drainage system. These valleys conduct groundwater flow from valley to valley in a southerly direction. Newark Valley, which borders the northwest portion of the Project Area, is the terminus of a groundwater flow system that includes the Northern Little Smoky Valley to the west (Harrill et al. 1988). The Sand Spring Valley (also known as the "Penoyer Valley") is thought to be a hydrologically closed basin, with no interbasin leakage (Van Denburgh and Rush 1973).

Table 3-6: Discharge of Major Springs in Valleys Adjacent to the Project Area

Northern Railroad Valley Springs	Estimated Discharge (cubic feet / second)
Big Warm Spring	13
Blue Eagle Spring	4
Lockes Big Spring	1
White River Valley Springs	--
Preston Big Spring	9
Arnoldson Spring	4
Cold Spring	3
Nicholas Spring	3
TOTALS	36

3.2.3. Groundwater Development and Use

Groundwater within and adjacent to the Project Area is withdrawn for a number of beneficial uses, including drinking water, agriculture (irrigation and stock watering), industry (mining and petroleum), and waterfowl management. Areas of concentrated groundwater use occur adjacent to the Project Area at the following locations (Thomas et al. 1986; Van Denburgh and Rush 1973; Maxey and Eakin 1949):

- Irrigation wells southwest of Currant in Northern Railroad Valley,
- Irrigation wells and springs near Preston and Lund in White River Valley,
- Irrigation water from springs in the Duckwater area of Northern Railroad Valley, and
- Flowing wells used to maintain waterfowl habitat in Federal wildlife management areas west of Blue Eagle Spring in Northern Railroad Valley.

Well records indicate a wide range of groundwater yields from wells drilled in the vicinity of the Project Area. Well yields up to 2,500 gallons per minute are reported for irrigation wells completed in the basin-fill deposits (Van Denburgh and Rush 1973). Reports for the Railroad and White River Valleys indicate that historical groundwater use has been well below the sustainable groundwater yields of the basins, and that decreasing the volumes of groundwater lost to evaporation and transpiration would create additional capacity for beneficial uses of groundwater (Van Denburgh and Rush 1973; Eakin 1966; Maxey 1949).

The most recent tabulation of groundwater yield and committed use for the Project Area and adjacent valleys is provided in Table 3-3. It also notes one groundwater basin that has been designated by the State of Nevada for protective restrictions (in accordance with the Nevada Administrative Code). Protective restrictions on water use occur in basins where permitted ground-water rights approach or exceed the estimated average annual recharge, and the water resources are being depleted or require additional administration. The Nevada State Engineer may declare preferred uses within such basins. The Sand Spring Valley, which borders the Project Area on the south, is a designated groundwater basin.

The Nevada State Engineer's Office has information on water rights holders in and around the project area; the website is (www.water.nv.gov).

Table 3-7: Summary of Groundwater Basin Yields and Committed Resources for Basins in the Project Area

Number	Basin Name	Perennial Yield (Acre-Feet per Year)	Committed Resources (Acre-Feet per Year)	Protective Restrictions in Basin?
154	Newark Valley	18,000	13,679	No
170	Sand Spring Valley	4,000	19,168	Yes
172	Garden Valley	6,000	366	No
173	Northern Railroad Valley	75,000	40,820	No
173	Southern Railroad Valley	2,800	5,329	No
174	Jakes Valley	12,000	54	No
207	White River Valley	37,000	25,007	No
TOTALS		154,800	104,423	

Source: Nevada Division of Water Planning (1992)

3.2.4. Groundwater Quality

Natural groundwater quality in the Project Area varies with well and spring location, well depth, and the types of rock through which the groundwater flows. Groundwater quality in the Northern and Southern Railroad Valley, as characterized by Van Denburgh and Rush (1973), is representative of groundwater quality in the Project Area, and is dominated by bicarbonate and either calcium or sodium, with total dissolved solids on the order of 200 to 500 parts per million (ppm). A limit of 500 ppm total dissolved solids is desirable for drinking water supplies because waters with high dissolved solids generally are of inferior palatability (American Public Health Association et al. 1998). Concentrations of minerals in groundwater in the Railroad Valley are generally lower in wells that are located away from the lowest valley floor areas or that penetrate deeper aquifers within the upper 2,000 feet of the basin-fill deposits. Suitable groundwater for drinking can be found throughout the Railroad Valley, although excessive levels of hardness and fluoride have been observed in some wells located in the Northern and Southern Railroad Valleys, respectively. Groundwater underlying the large playa in Northern Railroad Valley is moderately saline.

Groundwater quality and temperature changes significantly with depth beneath the Project Area. While the temperature of water in Railroad Valley wells less than 1,200 feet deep ranges from 50 to 70 degrees F, data from exploratory oil wells show steady temperature increases with depth, to readings of over 200 degrees F at depths of 10,000 feet (Van Denburgh and Rush 1973). Saltwater encountered in oil wells has salinity on the order of 25,000 to 30,000 ppm, reflective of the ancient seawater that occurs in basin rocks at these depths.

Thermal springs that receive groundwater discharge from deep rock formations occur near the Project Area, with temperatures as high as 140 degrees F and total dissolved solids as high as 850 ppm.

3.2.5. Forest Management Direction

Granting of leases and drilling permits for oil and gas exploration on Forest Service lands is a process subject to Federal and State regulations. Key regulations that apply to this process and incorporate provisions relating to groundwater quantity and quality are summarized in Table 3-4.

3.2.6. Sensitive Resource Components

The following Sensitive Resource Components pertaining to groundwater in the Project Area have been identified:

- Groundwater quality in aquifers suitable for beneficial consumptive uses such as domestic drinking water, agriculture, industrial supply, and waterfowl management; wells or springs that obtain water from these aquifers.
- Groundwater quantity (including water levels and water pressure) in aquifers suitable for beneficial consumptive uses, as described above.
- Fluid pressures in oil production zones that extend beneath multiple lease areas.

Table 3-8: Federal and State Regulations Pertaining to Groundwater Quantity and Quality for Oil and Gas Leases

Activity	Regulation	Entity	Key Provisions Relating to Groundwater
Oil and Gas Leasing	Chapter 43, Code of Federal Regulations, Group 3100	U.S. Department of the Interior, Bureau of Land Management (BLM)	Environmental obligations require that leasehold operations do not result in undue damage to subsurface resources
Geophysical and Drilling Operations	Standard Practices and Procedures for Geophysical Operations and Conditions of Approval	BLM	No blasting permitted within ¼ mile of water wells or springs; portable mud pits recommended to protect natural resources; no drilling or storage facilities allowed within 500 feet of any spring; hazardous materials must be contained; use of springs and wells on government lands requires written approval of the water rights holder
Oil and Gas Operations	Chapter 522, Nevada Administrative Code	Nevada Division of Minerals	Unlined brine collecting pits are prohibited; all potentially usable groundwaters must be protected
Injection Wells for the Production and Storage of Oil and Gas	Chapter 445 NAC	Nevada Division of Environmental Protection	Specific technical and permit requirements for Class II injection wells
Appropriation of Public Waters	Chapter 534.444 NAC	Nevada Division of Water Resources	Waivers of groundwater withdrawal permits are allowed for use of groundwater to explore for oil, gas, or geothermal resources

3.3. Air Quality

3.3.1. General Description

Air quality in the Project Areas is generally considered to be very good. Most of the Project Area is over 50 miles from populated areas and traffic on the major roads, including Highway 6 through the southern White Pine Division, is light. Visibility on calm days will typically exceed 20 miles on the valley floors and 100 miles from the highest peaks. On a local scale, dust from unpaved roads can be a nuisance, but only for a short time.

High velocity winds erode surface soils and transport particles. Railroad Valley is known for poor air quality when dust storms develop in strong winds. The air quality is diminished downwind from the valley; typically northeast towards the White Pine Range.

The Project Area is classified as a Class II attainment area. Attainment areas are rated “Better than National Standards” or “Can Not Be Classified” for Federal National Ambient Air Quality Standards (NAAQS) of all criteria pollutants, including ozone, particulate matter, carbon monoxide, sulfur dioxide, nitrogen dioxide and lead.

3.3.2. Forest Management Direction

The Forest Plan does not address air quality; however, it is addressed through the *Clean Air Act* (CAA), as amended, which provides for the establishment of NAAQS. Establishment of ambient air quality standards is the responsibility of the EPA and the State of Nevada Division of Environmental Protection (NDEP).

Air quality is considered acceptable if pollutant levels are continuously less than or equal to NAAQS or, in the case of short-term Federal standards (24-hour average or less), exceed the standards no more than once each year. State of Nevada ambient air quality standards are also not to be exceeded.

All proposed actions must comply with all Federal, State, and local laws and regulations including CAA, *Federal Land Policy and Management Act*, and the *Wilderness Act*. The latter two acts include provisions for protection of Wilderness. The CAA, administered by the EPA, is designed to protect the public health and welfare which includes designated national Wilderness. Under the CAA, NAAQS have been promulgated to meet the goals of the *Clean Air Act* and the protection of public health and welfare.

3.3.3. Sensitive Resource Components

There are no sensitive resource components for air quality. Oil and gas leasing activities will be permitted using BMPs. If future project proposals identify that air quality may be an issue, it will be analyzed during the site-specific environmental analysis and appropriate mitigation may be incorporated into the project permits.

4. WILDERNESS, INVENTORIED ROADLESS AREAS, RECREATIONAL SETTING, AND SCENIC RESOURCES

4.1. Introduction

People value the opportunity to experience the environment in a natural setting. Such experiences include spiritual renewal; aesthetic appreciation; and recreation activities such as camping, hiking, hunting, fishing, driving, and wildlife viewing. Some people derive satisfaction through knowing that areas such as the White Pine, Grant, and Quinn Canyon Ranges exist, even if they are not frequent users of those areas.

4.2. Designated Wilderness

4.2.1. General Description

As of November 2006, there are three designated Wilderness areas totaling 113,000 acres within the Project Area. The Grant Range Wilderness (50,000 acres), Quinn Canyon Wilderness (27,000 acres), and Currant Mountain Wilderness (36,000 acres) were designated in 1989 under the Nevada Wilderness Protection Act (Figure 3-18 and 3-19). These Wildernesses encompass some of the most remote and undeveloped lands within the state of Nevada. Elevations range from around 6,500 feet to over 11,000 feet at the highest peaks. All provide excellent opportunities for primitive dispersed recreation such as hiking, camping, and hunting. Due to the distance from population centers, the Wilderness receives extremely light use. These Wildernesses provide a unique opportunity for solitude and challenging primitive recreation opportunities, qualities not available in many Wildernesses in more populated or more easily accessible areas.

4.2.2. Forest Management Direction

The current Forest Plan provides for protection of the Wilderness in accordance with the Wilderness Act of 1964 and the 1989 Nevada Wilderness Protection Act. Non-conforming uses and activities such as use of motorized equipment, road building, and permanent structures are not allowed.

4.2.3. Sensitive Resource Components

Wilderness is considered a sensitive resource component. Impacts on the Wilderness will be carried further in this analysis even though activities will not be allowed within the Wilderness.

4.3. Inventoried Roadless Areas

4.3.1. General Description

Roadless areas were inventoried in 1998 as part of a Forest-wide inventory of undeveloped/roadless areas (Figure 3-18 and 3-19). This inventory utilized updated digitized Primary Base Series maps with internal and public review to determine those areas that had at least 5,000 contiguous acres in generally natural/undeveloped condition.

Most of the roadless areas in both divisions, especially those greater than 5,000 acres in size, provide opportunities for primitive and semi-primitive recreational activities including camping, hiking, mountain biking and recreational driving. Some of the larger roadless areas provide a primitive recreational experience for the visitor. This experience is equivalent to the experience one may find in a Wilderness area. The other less primitive roadless areas provide visitors with unique experiences in a semi-primitive setting.

4.3.1.1. White Pine Division

Twenty-four areas were identified as Undeveloped/Roadless in the 1998 inventory. The areas range from 22 to about 36,000 acres with a total of 207,127 acres (Table 3-9).

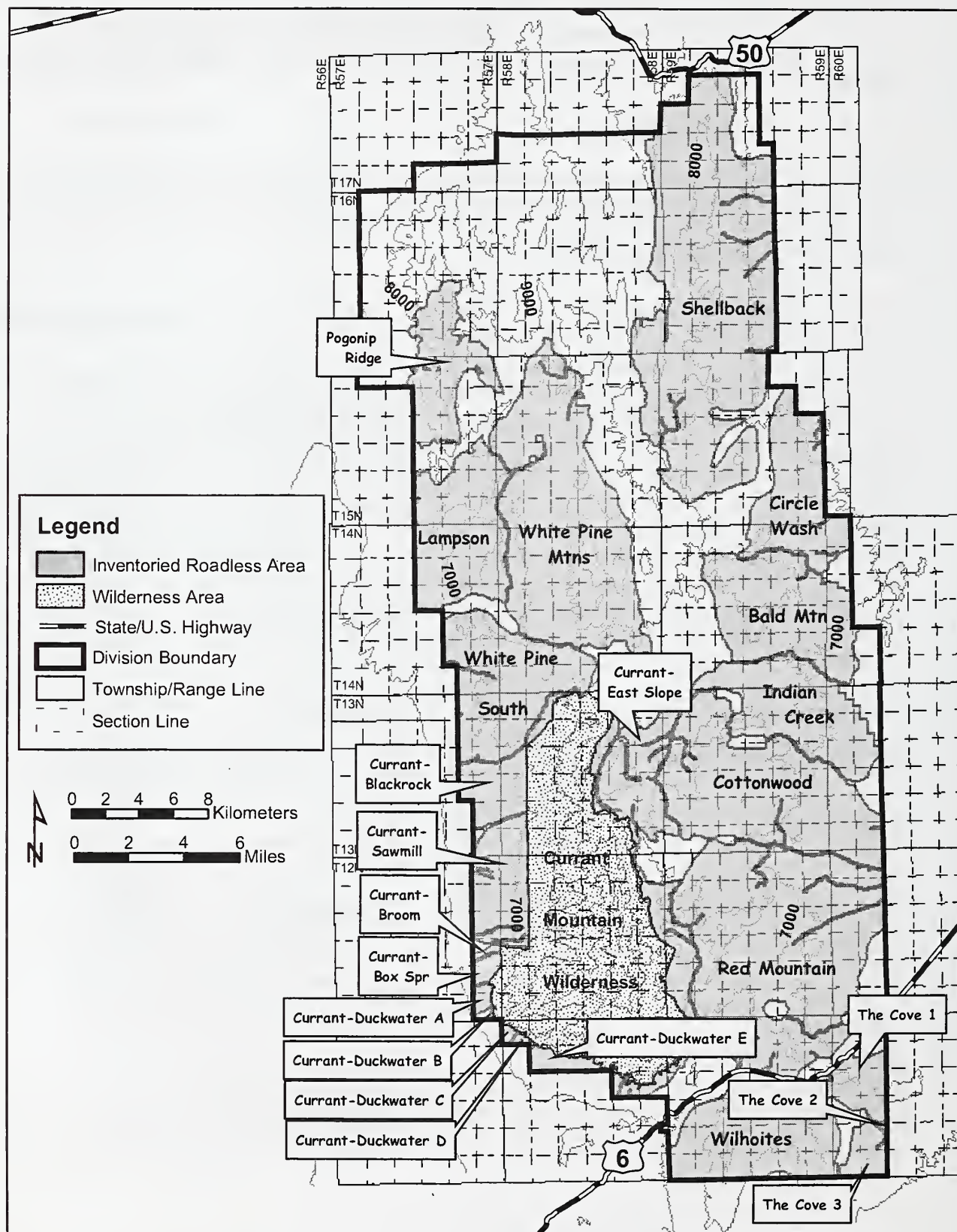
4.3.1.2. Grant-Quinn Division

Seventeen areas are identified as Undeveloped/Roadless in the 1998 inventory. These areas range from 160 to 62,000 acres with a total of 128,877 acres (Table 3-9)

Table 3-9: Summary of Inventoried Roadless Areas in the project area.

White Pine Division		Grant-Quinn Division	
Name	Acres	Name	Acres
Bald Mtn	11,758	Barton Creek	8,647
Circle Wash	8,782	Barton Spring	1,754
Cottonwood	18,155	Black Spring	11,011
Currant-Blackrock	3,693	Grant-Bruno	4,823
Currant-Box Spr	508	Grant-Burnt Cyn	125
Currant-Broom	158	Grant-Cherry Cyn	160
Currant-Duckwater A	410	Grant-Horse Spr	274
Currant-Duckwater B	22	Grant-Irwin	11,191
Currant-Duckwater C	193	Grant-Little Deer Sp	177
Currant-Duckwater D	151	Grant-Lower Scofield	5,814
Currant-Duckwater E	1,102	Grant-Rimrock	4,558
Currant-East Slope	10,098	Grant-Scofield	3,263
Currant-Sawmill	5,362	Grant-Troy	3,826
Indian Creek	9,993	Grant-Wadsworth	610
Lampson	10,728	Grant-Wiregrass	8,535
Pogonip Ridge	6,626	Quinn	62,432
Red Mountain	30,233	Quinn Canyon Springs	1,677
Shellback	36,441		
The Cove 1	2,846		
The Cove 2	51		
The Cove 3	1,728		
White Pine Mountains	25,234		
White Pine South	11,560		
Wilhoites	11,295		
TOTALS	207,127		128,877

Figure 3-18: White Pine Division – Wilderness and Inventoried Roadless Areas (IRAs)



Legend

- Inventoried Roadless Area
- Wilderness Area
- Division Boundary
- Township/Range Line
- Section Line

Grant-irwin
Grant-Wiregrass
Grant-Troy
Grant-Burnt Cyn
Grant-Horse Spr
Grant-Little Deer Sp
Grant-Scotfield
Grant-Lower Scotfield
Grant-Rimrock
Grant-Bruno
Grant-Wadsworth
Grant-Cherry Cyn
Black Spring
Barton Spring
Quinn Canyon Springs
Quinn Canyon Wilderness
Grant Range Wilderness

T7N
T6N
T5N
T4N
T3N
T2N
T1N
R54E
R55E
R56E

0 2 4 6 8 Kilometers
0 2 4 6 Miles

4.3.2. Roadless Area Characteristics

- 1) High quality or undisturbed soil, water, and air. With limited exceptions, these areas provide high quality or undisturbed soil, water and air.
- 2) Sources of public drinking water. There are no municipal watersheds or public drinking water facilities in or near any of the IRAs.
- 3) Diversity of plant and animal communities. The roadless areas contain a diverse mix of plant and animal communities. See the Wildlife and Vegetations sections of Chapter 3 for a complete description of species.
- 4) Primitive, semi-primitive non-motorized, and semi-primitive motorized classes of dispersed recreation. The roadless areas provide high quality opportunities for backcountry recreation such as hiking, backpacking, camping, hunting, and four-wheel driving.
- 5) Habitat for threatened, endangered, proposed, candidate and sensitive species and for those species dependent on large undisturbed areas of land. Habitats for these species are discussed in both the Wildlife and Vegetation sections of Chapter 3.
- 6) Reference landscapes. Reference landscapes are largely undisturbed landscapes retaining natural character and with naturally functioning ecosystems. These areas can be used as comparison areas that may be useful to study the effects to more intensively managed areas. The majority of the areas function as reference areas due to the limited amount of human disturbance and the integrity of the ecosystems.
- 7) Natural appearing landscapes with high scenic quality. For the most part, the apparent naturalness remains high for these roadless areas. Livestock grazing roads, and recreational uses have slightly reduced the scenic quality.
- 8) Traditional cultural properties and sacred sites. The IRAs are located within the traditional homeland of the Western Shoshone peoples. See the Heritage Resources and Tribal Resources section of this document for a description of properties and sites.
- 9) Other Locally Identified Unique Characteristics. There are few unique or outstanding individual features in the Project Area, but the remoteness and wild quality of many of these roadless areas is unique. There are impressive rock formations, a variety of natural vegetation types, and remote high grasslands.

4.3.3. Wilderness Attributes

- 1) Natural integrity. There is some evidence of historical mining in some of the roadless areas, but many are still intact with very few visible disturbances. Cattle grazing, both present and historical, has left an impact on most of these roadless areas, so the natural integrity has been compromised to some extent.
- 2) Apparent naturalness. For the most part, the apparent naturalness of the roadless areas is high, but has been slightly reduced by the same issues affecting natural integrity.
- 3) Remoteness. These roadless areas are all remote and located far from population centers, with some ranching and mining developments occasionally visible, but not widespread.

4) Solitude. These roadless areas are generally undeveloped and seldom visited in this region. One can find a feeling of solitude in any of these roadless areas. The wild and remote feeling of Eastern Nevada is very rare.

5) Opportunities for primitive recreation. A primitive recreation experience is one where the visitor sees little evidence of the works of humans. Currently there are many places in the roadless areas where this experience could be found. Also there are areas where mining, grazing, motorized recreation and other evidence of humans exist, but these are dispersed.

6) Special feature (ecological, geologic, scenic, or historical). There are few unique or outstanding individual features in the Project Area, but the remoteness and wild quality of many of these roadless areas is unique. There are impressive rock formations, a variety of natural vegetation types, and remote high grasslands.

7) Manageability (as Wilderness). The larger roadless areas within the project area have a high degree of manageability. The smaller roadless areas have a limited degree of manageability.

4.3.4. Forest Management Direction

Amendment No. 1 to the Humboldt *Forest Plan* stated that “Roadless areas not designated as Wilderness will be managed for uses other than Wilderness and will be re-evaluated in further Wilderness considerations during the next planning period.”

Interim Directive #1920-2004-1 also established national direction for the protection of IRAs. The policy states that “inventoried roadless areas, shall as a general rule, be managed to preserve their roadless characteristics. However, where a line officer determines that an exception may be warranted, the decision to approve a road management activity in these areas is reserved to the Chief or the Regional Forester.”

4.3.5. Sensitive Resource Components

Inventoried roadless areas are considered a Sensitive Resource Component.

4.4. Recreation Setting

4.4.1. General Description

Recreation settings are inventoried and described using the Recreation Opportunity Spectrum (ROS) (Figures 3-20 and 3-21). This system considers difficulty of access and naturalness of the landscape in classifying the recreational setting. Areas are generally classified as primitive (P), semi-primitive non-motorized (SPNM), semi-primitive motorized (SPM), and roaded natural (RN).

The current ROS inventory does not distinguish between SPM and RN. The key difference between them is the level of road access and traffic volume, and this information was not available at the time the inventory was produced. However, in general, most of the RN areas in the inventory are either SPM or RN with very low use levels. The Project Area has few developed recreation sites and no maintained trails. The expected visitor experience is a less developed experience with many opportunities for primitive and unconfined recreation.

4.4.1.1. White Pine Division

Most of the White Pine Division is SPNM (199,316 acres, or 57 percent) and RN/SPM (135,522 acres, or 39 percent). There are 15,839 acres of PR with a majority of the acres inside the Currant Mountain Wilderness. Only the corridor along U.S. Highway 6 has traffic volumes consistent with RN settings. Use on many roads is so infrequent that even though the technical classification is SPM, the feeling is more like SPNM.

The Division has one developed campground, White River, with eight campsites. The campground gets light to moderate use, with usually one to two sites occupied at a time during the high use season. Elsewhere, there are isolated, individual campsites that get infrequent use.

The dominant recreational uses of this division are hunting and recreational driving. The northern part of the Division has a network of challenging roads and four-wheel drive (4WD) trails connecting the many ghost towns and mines. Elsewhere, historic stage roads and freight routes extend this network. Hunters visit the area in the late summer through fall because the area affords hunting success and is close to Ely. Ellison Creek, White River, and Illipah Creeks are the only fisheries.

Overall, recreational use is light and tends to be focused in the key areas mentioned above and occurs particularly during hunting season.

4.4.1.2. Grant-Quinn Division

A majority of the Grant-Quinn Division is SPNM (127,135 acres, or 58 percent). There are, however, some large areas with PR settings, both within the established Wildernesses and south of Quinn Canyon (50,491 acres, or 23 percent). A relatively small portion of the area is currently classified as RN. All these RN areas should be considered SPM; and of these, most get such infrequent use that the feeling is more like SPNM.

The Division has one developed campground, Cherry Creek, with four campsites. The campground gets slight use, and is frequently empty. Elsewhere in the Division there are isolated campsites that get infrequent use (once a year at most). This Division gets very little recreational use of any kind.

Figure 3-20: White Pine Division – Administrative sites, Recreation Sites and Recreational Opportunity Spectrum (ROS)

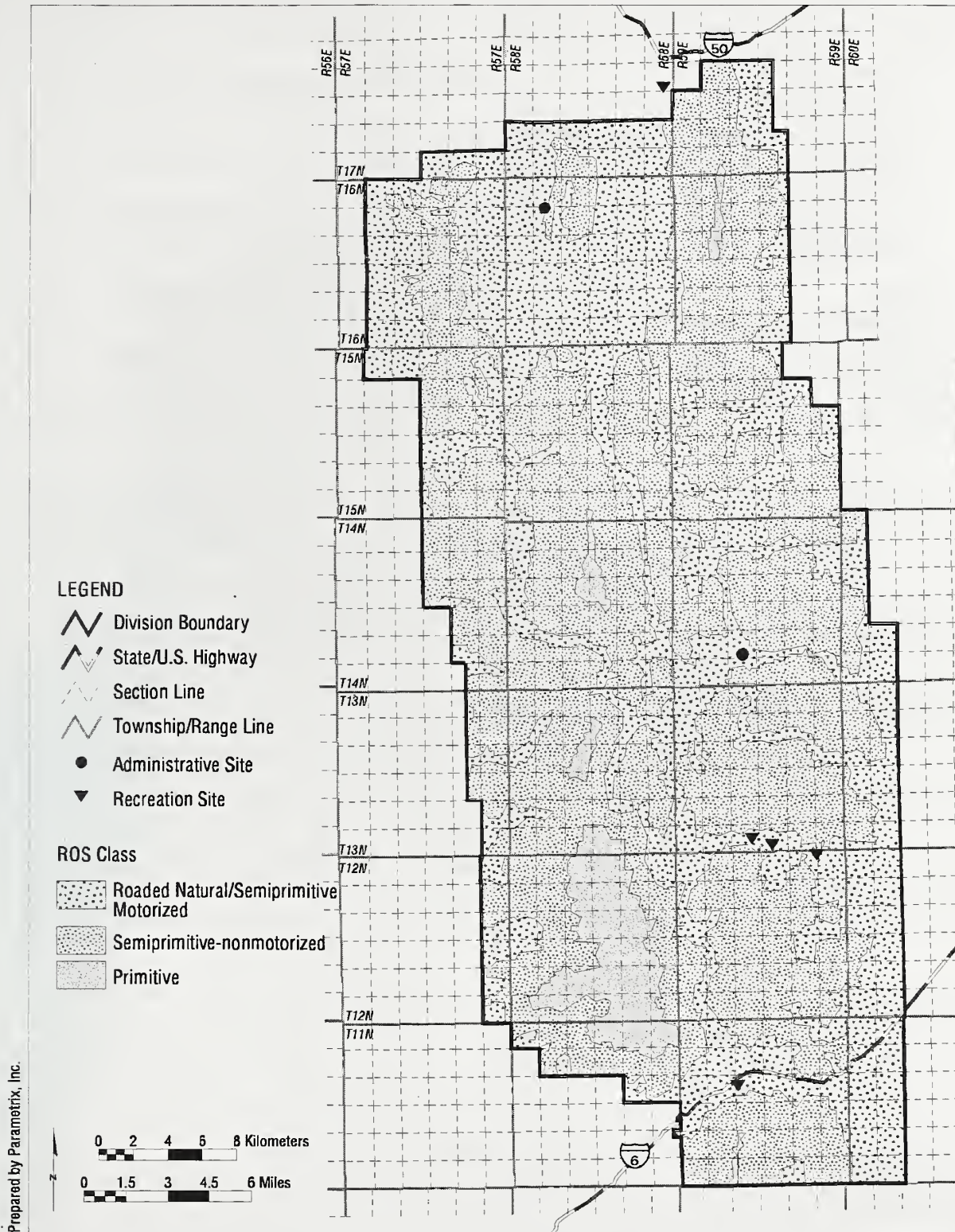
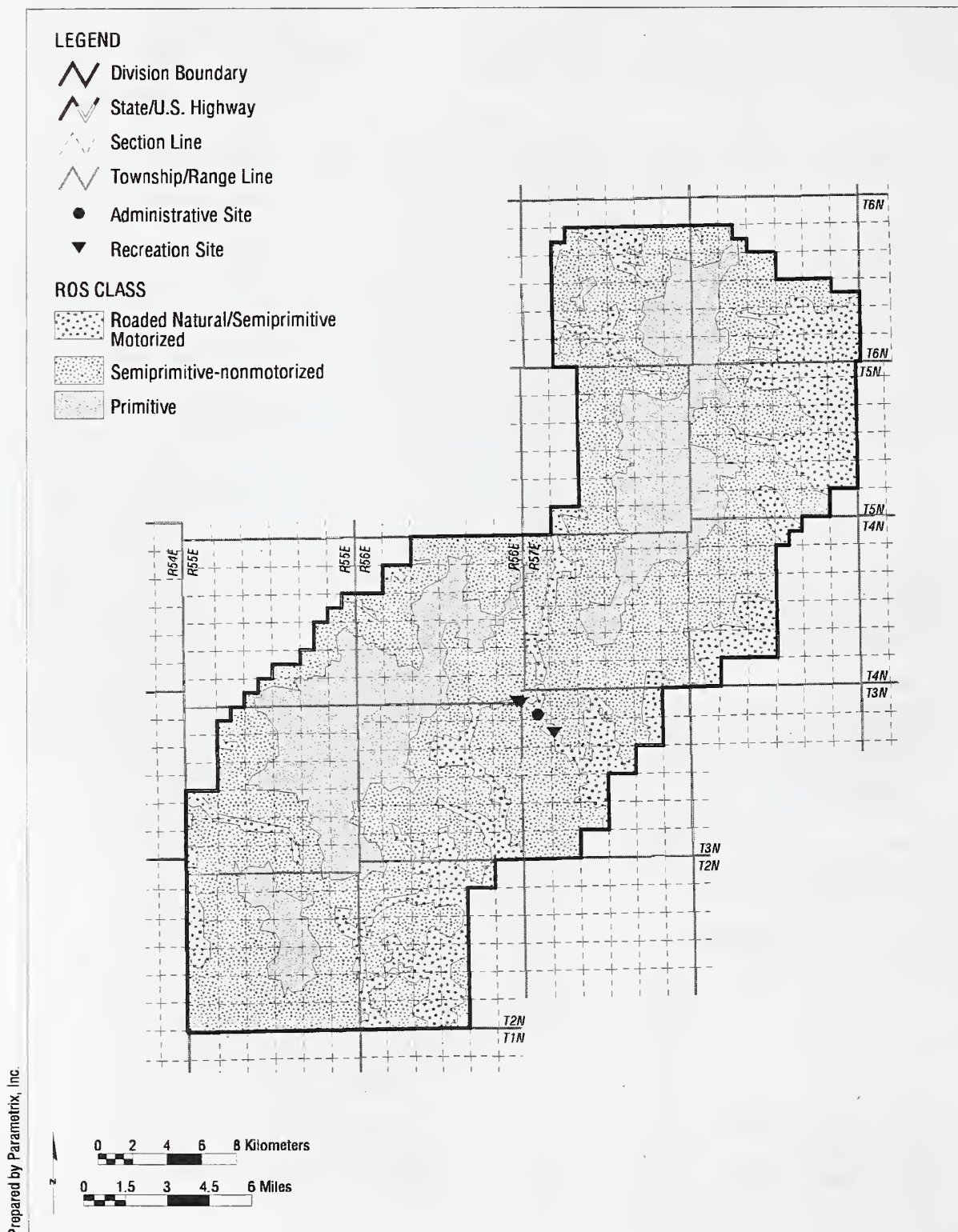


Figure 3-21: Grant-Quinn Division – Administrative sites, Recreation sites and Recreational Opportunity Spectrum (ROS)



4.4.2. Forest Management Direction

The current Humboldt *Forest Plan* directs that the current inventory of SPNM recreational settings be maintained and that there be no permanent road building except for mineral development.

4.4.3. Sensitive Resource Components

Developed campsites should be protected from development. While they are small and only lightly used, they also occupy a tiny percentage of the land base and are difficult for the districts to replace.

SPNM and P recreational settings, while common in the Division, are rare nationally, and, once developed to a higher scale, generally can not be successfully rehabilitated back to a lower scale.

4.5. Scenic Resources

4.5.1. General Description

Scenic Quality and Visual Quality Objectives (VQO) were inventoried and established in the 1986 Humboldt *Forest Plan*. They have not been updated or modified since.

Visual Quality Objectives are categories of acceptable landscape alterations measured in degrees of deviation from the natural appearing landscape. These objectives were set in the *Forest Plan*. These objectives are defined as:

- Retention Objective (R) allows only ecological changes.
- Partial Retention Objective (PR) allows only those changes that are not evident to the casual Forest visitor.
- Modification Objective (M) allows human activity to dominate the characteristic landscape but must, at the same time, follow naturally-established form, line, color, and texture. It should appear as a natural occurrence when viewed in the foreground or middleground.
- Maximum Modification Objective (MM) allows human activity to dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background.

In 1989, Currant Mountain (White Pine Division) and Grant and Quinn Canyon (Grant-Quinn Division) Wildernesses were established. For the purpose of this project, the Retention VQOs will be applied to these Wildernesses. This has no net effect on the alternatives under analysis since the Wildernesses are withdrawn from leasing.

Partial Retention objectives are in place for areas with relatively high recreation use or public visibility. A Modification objective covers most areas that may be accessed by roads, and Maximum Modification often applies to areas seldom seen.

4.5.1.1. White Pine Division

Most of the Division (71 percent) has Modification or Maximum Modification objectives. Most exploration and development work could occur, under general practices, and meet these objectives. Areas around White Pine Mining District, northern Moorman Mountains, and the White River/Currant Creek areas in the south part of the Division have Partial Retention objectives. Some adjustment of management practices for oil and gas exploration and development must be imposed to meet these

objectives. In addition to the Currant Wilderness, the Retention objective applies to a portion of the U.S. Highway 6 corridor (see Table 3-11 and Figure 3-22).

4.5.1.2. Grant-Quinn Division

The majority of the Division is split between Retention (36 percent) and Modification (37 percent) objectives. Large areas (19 percent) in the northeast and southern parts of the Division have Maximum Modification objectives, including areas directly adjacent to established Wilderness. The Cherry Creek road corridor and an area around Troy Historic District have Partial Retention Objectives which will impose some constraints on development (see Table 3-11 and Figure 3-23).

Table 3-11: Summary of Visual Quality Objective Classes for White Pine & Grant-Quinn

VQO Objective Class	White Pine		Grant-Quinn		Total	
	Acres	Percent	Acres	Percent	Acres	Percent
Maximum Modification	162,112	46%	42,631	19%	204,743	36%
Modification	87,484	25%	80,739	37%	168,223	30%
Partial Retention	63,123	18%	17,157	8%	80,280	14%
Retention	37,960	11%	78,705	36%	116,665	20%
TOTAL	350,679	100%	219,232	100%	569,912	100%

Figure 3-22: White Pine Division – Visual Quality Objective (VQO)

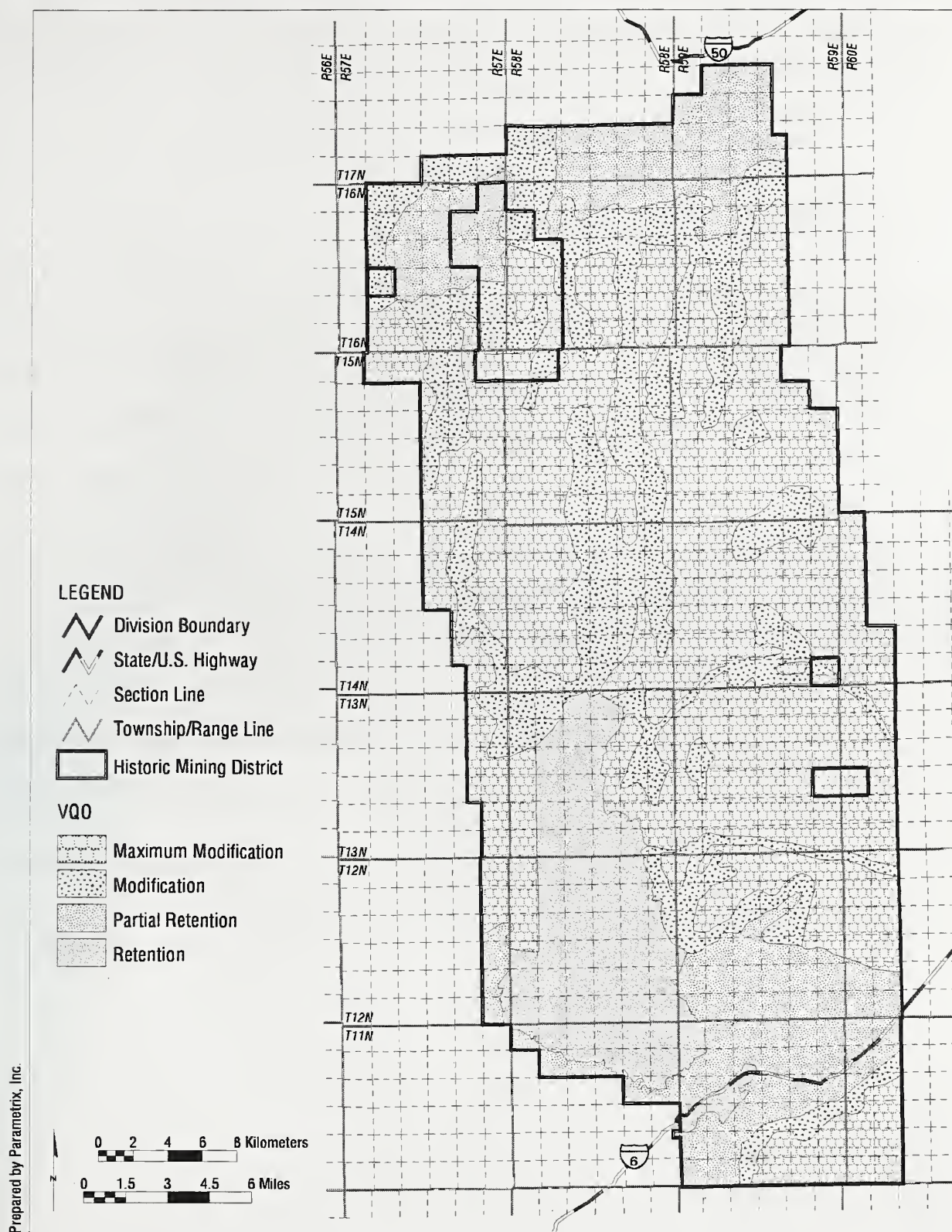
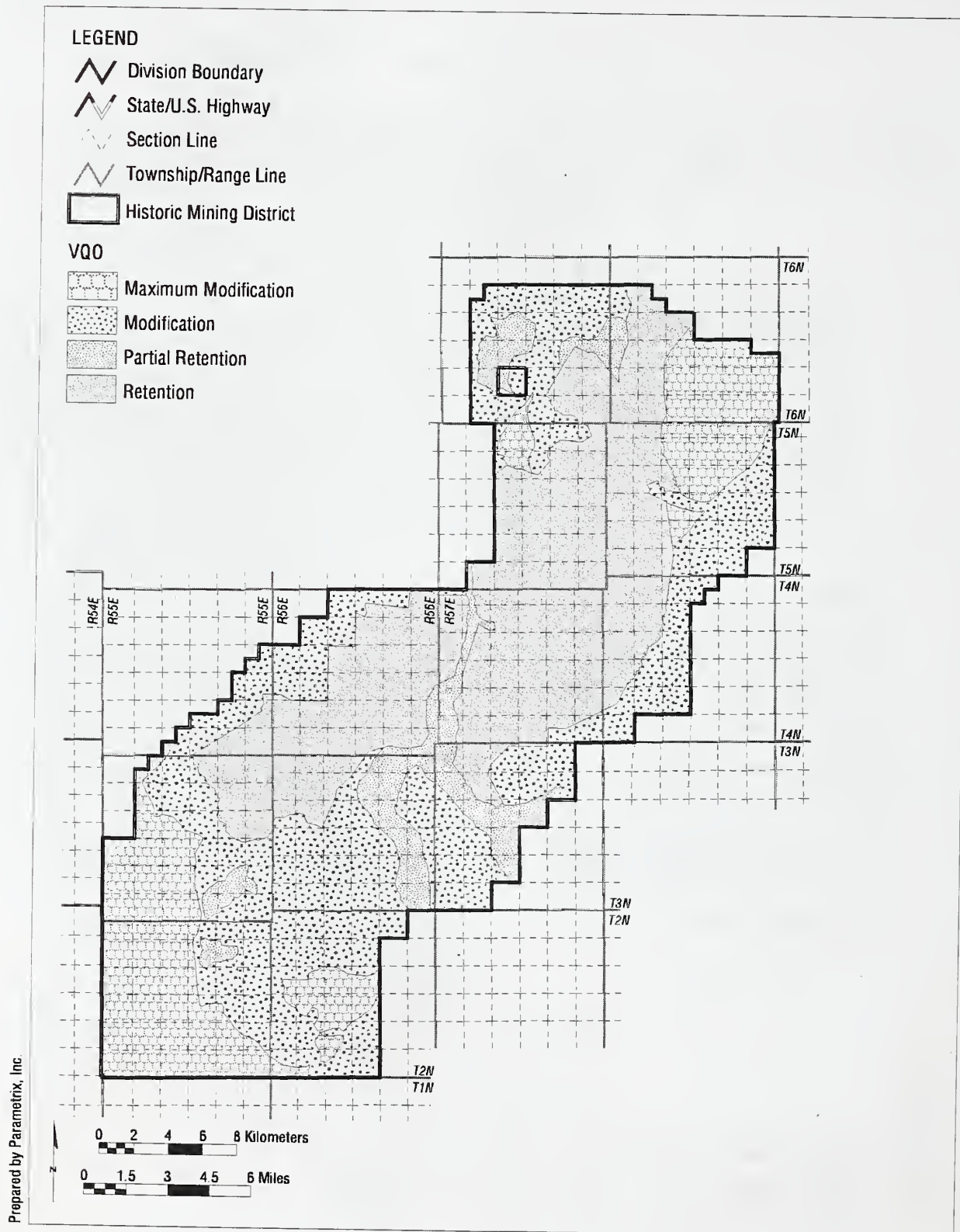


Figure 3-23: Grant-Quinn Division – Visual Quality Objective (VQO)



4.5.2. Forest Management Direction

Forest Management for visual resources is defined in the Forest Service Manual under “Landscape Management” (*FSM 2380*). Guidelines for determining the effects and extent of activities are included in the manual as well. The following goal is in the *Forest Plan*:

- Provide for a pleasing visual landscape in the Humboldt National Forest.

The following management direction is also found in the *Forest Plan*:

- Manage the visual landscape, as inventoried, with the planned Visual Quality Objectives.

4.5.3. Sensitive Resource Components

Meeting current *Forest Plan* direction will require stipulations beyond those in the Standard Stipulations for areas with Partial Retention and Retention Objectives. These areas should be considered the sensitive scenic resource components.

4.6. Noise

4.6.1. General Description

Both of these Divisions and the central Nevada area in general are noted for their silence. With the exception of overhead planes, U.S. Highway 6 vehicle traffic, backcountry road motorized use, and mineral exploration and mining, there are few noise sources within the Project Area. Ambient noise levels are unusually low compared to other developed regions of the State. Minimal amount of vegetative dampening and long line-of-sight distances allows noise to travel for greater distances. Very low human population densities limit the exposure and effect on humans. This same low human influence may cause human noises to have greater effects on wildlife.

4.6.2. Forest Management Direction

There is no direction for this resource in the Humboldt *Forest Plan* or in Forest Service manuals or handbooks.

4.6.3. Sensitive Resource Components

Changes in the noise environment will primarily affect solitude, which is also addressed in the scenery, recreation settings, and roadless issues.

4.7. Light

4.7.1. General Description

The Project Area has few developments and minimal human light sources. With the exception of headlights along U.S. Highway 6 in the White Pine Division: the Project Area is unusually dark. Combined with the thin and usually clear air, night skies are exceptionally brilliant.

4.7.2. Forest Management Direction

There is no direction for this resource in the Humboldt *Forest Plan*.

4.7.3. Sensitive Resource Components

There are no sensitive resource components related to light. Impacts from light are addressed in the Recreation section of Chapter 4.

5. SOCIO-ECONOMICS, HERITAGE RESOURCES, AND OTHER RESOURCE VALUES

5.1. Introduction

Residents of rural Nevada place a high value on access to National Forest System lands, including recreation, tourism, and commodity production such as, minerals, forage, fuel wood, and hydrocarbons, which help support community economic sustainability. Residents also place a high value on their historic roots to the area. Many residents have ties to the land and the role that it has played in their cultural origins. For American Indian populations, this tie may be especially strong since their history in the area is thousands of years old.

5.2. Access and Transportation

5.2.1. General Description

Roads in the Project Area serve two primary functions: access and recreation opportunities. The recreational aspects of roads are addressed in the preceding section. Rough, inhospitable terrain and long distances to population centers generally limit motorized access in the Project Area. Multiple access routes to locations are rare, and road densities are low: 0.86 mile/square mile for the White Pine Division and 0.46 mile/square mile for the Grant-Quinn Division (Table 3-12 and Figures 3-15 and 3-16). Most roads (90 percent) are primitive, with unimproved surfaces. U.S. Highway 6 located near the south edge of the White Pine Division is the only paved road. Maintenance of roads on NF System lands is infrequent, and passable road miles decrease each year as weather events and vegetation outpace repairs.

5.2.2. Forest Management Direction

The Humboldt *Forest Plan* has numerous S&Gs which apply to road design and construction. This direction will affect any road construction or reconstruction the same way in all alternatives.

5.2.3. Sensitive Resource Components

No sensitive resource components for roads have been identified. All road construction will be permitted in accordance with the Humboldt *Forest Plan* and BMPs.

Table 3-12: Summary of Road Density in White Pine & Grant-Quinn Divisions

Type	White Pine Roads (miles)	Grant-Quinn (miles)	Total Roads (miles)
Primary Highway	9	0	9
Improved, Dirt	65	2	67
Unimproved	301	125	426
Unimproved, 4 Wheel Drive	92	30	122
TOTAL ROADS	468	157	625
Acres	350,678	219,232	569,910
Square miles (acres/640)	548	343	891
Road Density (total road miles / square miles)	0.9	0.5	0.7

5.3. Heritage Resources

5.3.1. General Description

Cultural resources are defined as any resource that is of cultural character. It can be used as a synonym for “historic property,” defined in the National Historic Preservation Act (NHPA) as “any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places” (16 U.S.C. 470w (5)) (NRHP). Cultural resources can also be used to refer to known properties that may be historic, but whose historic character has not been established or evaluated, or that do not meet the defined eligibility criteria. Cultural resources generally include both prehistoric and historic archaeological sites and traditional cultural properties, but may also include intangible elements of culture, such as community values and cultural uses of the natural environment.

The Forest Service is mandated by the NHPA to take into account the effect any approved undertaking will have on cultural resources and their Area of Potential Effect (APE). The Forest Service must also coordinate and consult with the Nevada State Historic Preservation Office (SHPO) and local tribal representatives on the effects and undertakings, and afford them a reasonable opportunity to comment.

Compliance with the above legislation and regulations is accomplished through the implementation of a two-step process, consisting of identification/evaluation of cultural resources, and assessment of effects. For this EIS, the first step consisted of identification of known (i.e., previously recorded) cultural resources within the Project Area. When specific areas of disturbance are known, a site-specific survey will be conducted to identify resources that may be impacted by the Proposed Action. This will take place after completion of the EIS, and prior to any ground disturbing activities. Because site-specific impacts and effects are not known at this time, the second step, assessment of effects, is executed at the time oil and gas exploration, development, or production activities are proposed. It is at this time the SHPO and local tribal representatives are consulted, as required under the revised (1999) Section 106 regulations.

All of the cultural resources previously identified in the Project Area were spatially plotted on the Forest Heritage Resource Geographical Information Systems (GIS) database to gain an idea of where sites are located. Inventory work has been largely restricted to historic preservation compliance work, stimulated by Section 106 of the *National Historic Preservation Act*. Much of this work typically consists of short linear surveys, many of which understandably have identified no cultural resources. Very few large block surveys have been undertaken. Due to the relatively small amount of inventory work done in the area, this spatial model conveys an impression of where sites were recorded, but this undoubtedly reflects where inventory efforts have been concentrated for various projects on the Forest, and not the actual distribution of sites.

Prehistoric isolates and lithic scatters dominate the inventoried Project Area. For instance, on the White Pine Division, 209 (71 percent) of the 296 recorded prehistoric cultural resources are identified as isolated finds or lithic scatters. Although the number is smaller on the Grant-Quinn Division, isolated finds for lithic scatters dominate the assemblage (20 [43 percent] of the 46 prehistoric cultural resources recorded). Other types of prehistoric cultural resources represented in the inventory include open campsites, rock shelters, habitation sites, stone circles, lithic sources/quarries, lithic, ceramic, and groundstone scatters, and rock art sites. Although many have not been reviewed for their eligibility to the NRHP, some of these sites could have subsurface deposits, and have substantial potential to yield important archaeological information (justification for NRHP eligibility under criterion “d”).

Additionally, a number of historic sites have been recorded. On the White Pine Division, 63 historic resources have been recorded. Of these sites, 24 are isolated finds (38 percent), and 24 (38 percent) are associated with mining activities. The remaining historic sites are associated with ranching, community development, communication, and transportation. There have been only five historic resources recorded on the Grant-Quinn Division; one isolated find, and others associated with mining and ranching. Again, many of the historic cultural resources have not been evaluated for eligibility to the NRHP.

5.3.2. Forest Management Direction

The Humboldt Forest Management Plan mandates compliance with national legislation protecting cultural resources, including project-by-project inventories prior to any ground disturbing activities. This includes the inventory, evaluation, interpretation, and management of any cultural resources. Under revised Section 106 (June 1999), coordination and consultation with the Nevada SHPO and local tribal representatives is required and necessary.

5.3.3. Sensitive Resource Components

Heritage resources are considered a sensitive resource component. If site-specific cultural resource surveys identify resources, Federal law will be followed during the environmental analysis, approval, and implementation of the permits.

5.4. Tribal Resources

5.4.1. General Description

This document differentiates among prehistoric cultural resources, historic cultural resources, and Tribal heritage resources. Planning for historic and prehistoric cultural resources is discussed in other sections. This section deals with Tribal heritage resources as defined under various authorities, including but not limited to AIRFA, Executive Order 13007, NAGPRA, and the NHPA. Under these authorities, the Forest Service has the responsibility for managing Tribal heritage resources by, in part, considering them in land

use planning and environmental documentation, and mitigating, where possible, impacts to places or resources important to contemporary Native Americans and federally recognized tribes.

Slight differences in definitions among the authorities notwithstanding, these resources generally can be defined as places or resources associated with cultural practices or beliefs of a living community that are rooted in a Tribal community's oral traditions or history, and are important in maintaining the continuing cultural identity of the community. In practice, this means identifying, evaluating, and managing: (a) ethnohistoric sites; (b) traditional use areas; (c) sacred sites and ceremonial sites; and (d) traditional cultural properties. These categories are elaborated below.

Since Tribal heritage resources are defined culturally by the people and groups that value them, these resources can only be identified and managed in consultation with the people infusing them with cultural value. In the final analysis and decision making, the Forest Service has the legal authority to determine how these resources would be managed and what, if any, mitigation would be used to avoid undue and unnecessary impacts to them.

5.4.2. Tribes

British and American fur trappers began penetrating the Great Basin in the 1820s. In 1830, Peter Skeene Ogden, the first documented non-Indian to enter the planning area, found it inhabited by Western Shoshone peoples. While there is no direct way to determine when the Shoshone people first occupied the area; it is clear that by 1830 they were well established and had been in the area for centuries.

Western Shoshone villages are ethnographically documented in Railroad Valley and along the White Pine and Grant-Quinn ranges. Primary villages were located near Hamilton (Bombasa and Akamba) Duckwater (Suhuva), near Green Springs (Wongodupijugo) Currant Creek (Bawazivi), Blue Eagle Spring (Biadoyava), Warm Springs (Bauduin) and Nyala. The ranges were utilized for the gathering of pine nuts, rabbit and antelope drives, and seed gathering. The area surrounding Duckwater was particularly important because of plentiful resources, and it was the location of midsummer festivals. Duckwater festivals increased in usage and popularity as transportation improved with the availability of the horse (Steward 1938: 117-121).

Steward's map shown in Figure 8 notes that the eastern side of the Quinn Canyon Range was utilized by both the Shoshone and the Southern Paiute. This area, and to the east of the Quinn Canyon Range, is quite sparsely populated and Southern Paiute people appear to have largely vacated this part of the region by the early 1900s or earlier. Little has been documented regarding the ethnohistoric use of the area east of this range (Steward 1938).

By the 1840s through 1860s, land acquisitions, ecological changes, and cultural disruptions caused by non-Indian immigration into the area were curtailing traditional lifeways among the Western Shoshone to the extent that they were becoming dependent on non-Indian communities. The loss of valuable food resources throughout the Western Shoshone Territory beginning in the 1840s also led to increased two-way hostilities and depredations on and by immigrants, ranchers, and communities. These culminated in military actions against the Western Shoshone in the 1860s. The ill-fated Treaty of Ruby Valley of 1863 was designed to provide for the safety of anglo immigrants, miners and communities, but did not remove the Tribe from its ancestral land and only provided a promise for lands to be set aside in the future. Between 1877 and 1879 Carlin Farms was established and abandoned as a small reservation, and, also in 1877, an Executive order reservation was set up in Duck Valley on the Idaho border in northern Elko County (Crum 1994). Many Western Shoshone and later Northern Paiute people moved to Duck Valley.

With resources depleted, many Western Shoshone people sought employment in communities and at various ranches across Nevada as ranch hands. The “White Pine Indian War”, of 1875, is said to have led to the abandonment of much of the Ely area and precipitated a move by the Goshutes to Deep Creek on the Utah border south of Wendover. The loss of Western Shoshone/Goshute help as ranch hands was felt in the Ely area for many years (Crum 1991). An Executive order in 1914 established the 34,560-acre Goshute Reservation at Deep Creek (Crum 1994).

Numerous individuals, families, and small bands remained in much of the Western Shoshone territory. Land for many of those Tribal members was not forthcoming until after the passage of the Indian Reorganization Act of 1934. The Duckwater Reservation was established in 1940. From 1940 to 1944 the government also purchased additional ranches to expand the reservation and Western Shoshone families from Smokey Valley, Cherry Creek, Warm Springs, Tonopah, Wells and White River moved there. The government leased 10 acres for the Ely Shoshone in 1973 and acquired an additional 90 acres in 1977 (Bengston 2003).

5.4.3. Tribal Consultation

Tribal Consultation is a process of identifying and seeking input from appropriate Tribal governing bodies, considering their issues and concerns, and documenting the manner in which the input affected the specific management decision(s) at issue. Federally recognized Western Shoshone Tribal governments with interests in the planning area are the Ely Shoshone Tribe and the Duckwater Shoshone Tribe. Additionally, Tribal members whose families traditionally occupied the area may reside at other Western Shoshone Tribal Reservations at Yomba, Battle Mountain, Goshute, or the Te-Moak Tribes’ Band subdivisions of Elko, Wells, Battle Mountain, and South Fork. For this review, Tribal issues were identified through an examination of the published ethnographic literature and the unpublished results of past consultations.

It is important to note that consultation is a good faith attempt to identify Tribal issues, seek Tribal input, and consider the result. There is no requirement for Tribes to respond to the Forest Service’s consultation efforts. The legal requirements of NEPA and other authorities seek information on many areas of Tribal knowledge (cultural, religious, or traditional) that are highly confidential and not easily revealed to outsiders. At the level of planning done here, Tribes are at times reluctant to share information when they cannot see a direct threat to places and resources they value. These, and other factors, limit the available information on specific locations that need management attention and force the Forest Service to base this EIS on a combination of management actions at specifically located sites and a more programmatic approach to prescribing management actions on the basis of sites and resource types.

5.4.4. Resources

The concept of “Spirit Power” and its impact on places, people, or events provides the basis for understanding the nature and distribution of places important to Western Shoshone people in the planning area. Tribal people believe that the Universe is a living thing, in which everything has differing amounts of Spirit Power. The amount or intensity of Spirit Power can change through time and across space in ways that cause events or allow individuals or groups to do things. Important events happen at particular places because those places have more Spirit Power than other places. Important people arise because they have high Spirit Power relative to others, and important groups arise because they have relatively high Spirit Power. Conversely, people and places can lose Spirit Power and fall into obscurity. Spirit Power can also be dangerous, and ordinary people do not casually seek it. It can come to people against their wishes and transform them into either good or evil shamans.

The belief in Spirit Power is also the basis for the Tribal argument that all lands and resources are sacred. While this argument is meaningful to Tribes, it is rarely useful in land use planning. Therefore, the approach adopted here is to focus on places where the ethnographic literature and past consultation suggest that high levels of Spirit Power have created especially significant places and resources that need specific management attention in this plan. These places include: (1) ethnohistoric sites; (2) traditional use areas; and (3) sacred sites. There is obvious overlap in the site types, and a place can be reasonably put into any or all of them. However, in this plan, each place or resource would be placed in only one category, and appropriate management actions are developed by category in the environmental consequences chapter.

5.4.5. Ethnohistoric Sites

Tribal ethnohistoric sites are most familiar to non-Indians because they are similar to the kinds of sites generally considered to be of historic interest. Since ethnohistoric sites are primarily defined by their prominence in living oral history, and recognized by elders as most important for physically mapping Tribal history and culture to particular places within the planning area, they may include sites that could also be considered sacred or ceremonial as well as ethnohistoric. Ethnohistoric sites at which positive events occur have high positive Spirit Power, and places where negative events occur have high negative Spirit Power. Places with positive Spirit Power are good places to be, while places with negative Spirit Power are to be avoided.

Important Western Shoshone ethnohistoric sites could include, but are not limited to: (1) habitation sites; (2) sacred sites; (3) trails; (4) ceremonial locations; (5) battle sites; and (6) burials.

5.4.6. Traditional Use Areas

Any traditional lifeway, such as ranching or ethnographic lifeways, that depends directly on natural resource extraction would over time develop places that are particularly important for their resources and history of resource extraction. Eventually, these areas assume a significant role in defining and maintaining the traditional lifeway. These traditional use areas become even more significant when the traditional lifeway is threatened by uncontrollable external changes. Contemporary Tribal identity and lifeways are developed and maintained by intergenerational use of traditional use areas.

In contrast, many other types of Tribal heritage resources associated with general Tribal activities and traditional use areas can be associated with (some argue even owned by) individuals. In addition, what non-Indians regard as identical resources in identical places (e.g., any pinion tree or grove is the same as any other) may in fact be very different because they have varying amounts of Spirit Power and may be used by a particular family or individual because of a special connection, through Spirit Power, between the place and the person.

Important Western Shoshone traditional use areas could include, but are not limited to: (1) pinion gathering locations; (2) basketry material sites; (3) medicinal plant and mineral gathering sites; and (4) group hunting (rabbit, antelope, or sheep drives) and fishing locations.

5.4.7. Sacred Sites

When most non-Indians think about Tribal heritage resources, they are thinking about sacred sites. As defined in EO 13007, sacred sites means any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by Indians.

Important sacred sites include, but are not limited to: (1) places that figure prominently in Tribal cosmology, such as origin locations; (2) prominent or unique geographic points, such as mountain peaks or unusual geological formations; (3) waters, especially lakes, rivers, and hot springs; and (4) ceremonial sites. Types of sacred sites are discussed further, below.

Sacred Geography. Mountain ranges incorporate mountain peaks and caves; these allow mountains to gather and hold Spirit Power and are important Tribal heritage resources throughout the planning area. Mountains are the source of most major waters, and mountains host resources, such as pinion, that are essential to survival. Origin points and creation sites are often found at mountain peaks. Shamans, doctors, and others seeking supernatural power would find it in mountain caves, and ordinary people went to caves to leave offerings soliciting supernatural help (Bengston 2003). Mountain peaks considered most sacred to the Western Shoshone in the area are not identified in this report.

Waters. Since Spirit Power flows through the earth and all living things like blood through the body, water (also obviously a scarce resource in a desert ecosystem) is sacred to the Western Shoshone. Water figures prominently in origin stories and other mythology. Lakes, rivers, major springs, and especially hot springs are centers for shamanistic, medicinal, and ceremonial activities. Shamans, storied heroes and villains travel along water (Spirit Power) networks and used them to communicate with the spirit world. People made offerings at springs and other waters to gain favor with spirit beings (Fowler 1992: 171). Water babies are small, very powerful spirit beings who inhabit deep water sources, such as major springs, rivers, and lakes (Fowler 1992:171). They are a source of power for doctors/shamans, but can hurt ordinary people (Fowler 1992: 171). Water babies make water flow, and an active water source would dry up if they abandon it (Fowler 1992:171). Marshes, small seeps, and small springs are too shallow to support water babies and are generally not considered to be strong Spirit Power sources. Because the water in hot springs is heated deep within the earth, hot springs are water baby habitat and thus considered sacred to the tribe.

Ceremonial Sites. There are places with high Spirit Power where shamans and healers do their work and where ordinary people go to connect with the supernatural (Bengston 2003:77-79). Such places include: (1) rock art sites; (2) caves and springs where individuals gain Spirit Power; (3) dance sites; (4) doctor (or medicine) rocks; (5) hot and cold springs; and (6) places where objects have been ritually placed (Bengston 2003 77-70). Some of these places contain physical evidence of use, and others do not. Doctor rock sites are of particular importance to the Western Shoshone and are used as prayer/offering places to seek medicinal relief or supernatural favors (Fowler 1992:178). The rocks themselves usually have numerous cupules pecked into them and have small offerings (coins, bullets, notes, buttons, etc.) left on or near them.

5.4.8. Traditional Cultural Properties

The concept of traditional cultural property (TCP) has created confusion in dealing with Tribal heritage resources because it is often used to refer to all types of Tribal heritage sites in all legal contexts. The term TCP was coined in National Register Bulletin 38 to refer to a property that may be eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community.

This has been interpreted to mean that all Tribal heritage sites are TCPs and by definition eligible for the National Register. In fact, the 1992 amendment to the NHPA clarified policy so that "properties of traditional religious and cultural importance to an Indian tribe may be determined to be eligible for inclusion on the National Register." Although the term TCP is not found in the NHPA or its

implementing regulations, it has become important for determining eligibility for compliance with Section 106 of the NHPA.

There are regulatory limitations on the National Register eligibility (such as a property having to be a definite location of human activity, with discernible exact boundaries, and be at least 50 years old) that limit its value in a general planning context. Because of this, the concept of TCP would only be used here when Tribes have specifically identified a resource as a TCP. This does not mean that the resources discussed here are not eligible for the National Register and thus not subject to Section 106 of the NHPA—they may well be eligible even if not identified as a TCP by a Tribe and subject to Section 106. There are no known TCPs in the area.

5.4.9. Forest Management Direction

The Humboldt Forest Management Plan mandates compliance with national legislation protecting Tribal resources, including project-by-project inventories prior to any ground disturbing activities. This includes the inventory, evaluation, interpretation, and management of any cultural resources. Under revised Section 106 (June 1999), coordination and consultation with the Nevada SHPO and local tribal representatives is required and necessary.

5.4.10. Sensitive Resource Components

Tribal resources are considered a sensitive resource component. Tribal consultation efforts would be undertaken at future planning stages (i.e., surface use plans, field development plans, issuance of leases) At these future stages, Tribal resources would be identified and appropriate measures proposed to ensure protection in accordance with applicable laws and regulations.

5.5. Grazing

5.5.1. General Description

There are 12 grazing allotments in the Project Area. Of these 12 allotments, 8 are currently permitted for livestock use, 3 are vacant, and 1 is closed. Effects to grazing operations due to oil and gas exploration or recovery measures would vary by site and should be subject to mitigation. The effects of an oil and gas project on a specific grazing operation should be considered in the site-specific analysis permitting that oil and gas activity.

5.5.2. Forest Management Direction

Forest management direction is to administer the range resource within the direction of the permit, allotment management plan, and annual operating plan, and to develop coordinated resource management plans with other user groups.

5.5.3. Sensitive Resource Components

There are no grazing-sensitive resource components to address in this analysis. If during the site-specific project analysis grazing impacts are identified, the Forest Plan will provide direction.

5.6. Socio-Economics

5.6.1. General Description

Management of the H-T NF has the potential to directly and indirectly affect the social and economic characteristics of the surrounding communities. Direct effects include jobs that are available from companies that develop and extract mineral resources on the Forest. Indirect effects are those jobs and businesses that supply goods and services to people who use the Forest. For example, workers and recreationists will need food and lodging, and will also need vehicle gas while they are within the Forest. Neighboring communities benefit economically as more people visit the National Forest either as workers or as recreationists.

5.6.2. Counties and Communities

The Project Area falls within central Nevada counties of Lincoln, Nye, and White Pine. All are considered rural and are sparsely populated. In 2005, the combined estimated population for the counties was 54,385 (Nevada Power 2006, a,b,c); a density of less than 2.0 people per square mile.

White Pine County. In 2005, the estimated population for White Pine County was 9,275. Between 1990 when the county population was 9,264 and today, the population has remained stable with no growth. White Pine County's largest community and county seat is Ely with an estimated population of approximately 4,200 in 2005. It is located approximately 35 miles east of the White Pine Division. Ely economy is based largely on ranching, mining, and government services. Located just north of Ely, McGill is the county's second largest town with an estimated population of 1,100 in 2005 (Nevada Power 2006, a)

Lincoln County. In 2005, the estimated population for this Lincoln County was 4,258. Between 1990 and 2000 the population has increased by approximately 10 percent. Lincoln County's largest community and county seat is Caliente with 1,015 people. Caliente was founded as a railroad town, and the railroad continues to be important to Caliente's economy. Along with the railroad and county government, Caliente also offers many services to travelers, because of its proximity to several state parks. After Caliente; Pioche, Panaca, and Alamo are the largest towns in Lincoln County, each with a population of less than 1,000 (Nevada Power 2006, b)

Nye County. In 2005, the estimated population for Nye County was 41,302. Of the three counties, Nye has seen the greatest growth in recent years. From April of 2000 to July 2004 the rate of growth was 16 percent. Pahrump is the largest community in the county with an estimated population of 33,241 in 2005. Located 60 miles from Las Vegas, Pahrump supports a large retiree population and workers who commute to Las Vegas. Tonopah, the county seat, had an estimated population of 2,607 in 2005. The only Nye County community near the Project Area, Duckwater, is located approximately 20 miles west of the White Pine Division. Most of the 150 residents are members of the Duckwater Shoshone Tribe (Nevada Power 2006, c).

5.6.3. Employment and Income

The primary sources of employment in the three counties are mining, services (including recreation and tourism), government, retail, and construction. In January of 2006, the total labor force in the three counties was approximately 22,000 workers. The unemployment rates for the three counties averaged 4.8 percent in 2005. This rate is slightly higher than the State's rate of 4.1 percent. The county with the highest unemployment rate is Nye County with a rate of 5.2 percent, followed by Lincoln County with a rate of 5.1 percent. White Pine County had the lowest rate at 4.2 percent (State of Nevada Department of Employment, Training and Rehabilitation 2006).

The median household incomes in White Pine, Nye, and Lincoln counties are generally lower than State average of \$45,250. In 2003, White Pine County's household income was \$36, 622, Lincoln County's

median household income was \$36,032, and Nye County's median household income was \$38, 276 (USDA, Economic Research Service, County 2005).

5.6.4. Economic Sectors

Service and Professional. The service and professional sector in the three counties is one of the strongest and largest sectors. This sector includes a variety of businesses and professions including retail and wholesale trade, health services, legal services, banking and financial services, and hotel and leisure services. Although recreation and tourism-related income and employment are not reported directly in the State of Nevada, the recreation and tourism industry is partially represented through the service and professional sector (Nevada Power 2006, d, e, f). The recreational activities that attract tourists to the area include hiking, exploring historic sites, fishing, hunting, bird watching, horseback riding, cross-county skiing, snowmobiling, and photography. Outfitters and guides also provide tour or hunt services; several guides are authorized to operate on the Ely Ranger District.

Government. Federal, state, and local governments are large employers in the three county area. Federal government agencies include the United States Postal Service, Bureau of Land Management, USDA Forest Service, Department of Defense, and Natural Resource Conservation Service. State government agencies include Nevada Highway Patrol, Nevada Division of Forestry, Nevada Department of Transportation, and Nevada Department of Corrections. County and local government employs people for the court system, sheriff's office, school system, health services, public works, and county administration (Nevada Power 2006d, e, f).

Mining. Mining is an important source of employment and revenue in the three counties. There are two gold mines in operation; Round Mountain Mine in Nye County and Bald Mountain Mine in White Pine County. The Robinson Copper Mine near Ely, resumed operations in the summer of 2004. Other mining operations in the three counties produce industrial minerals, building stone, and sand and gravel. While the mining industry in Nevada is subject to boom and bust cycles, the forecast by the Nevada Department of Minerals is for this industry to remain strong in the future (NDOM 2006, a).

Agriculture. A prominent industry in the three counties is farming and ranching. In 2002, there were 402 farms: 172 were located in Nye County, 121 in White Pine County, and 109 in Lincoln County. Livestock production is the main component of the farms in this area. Production of forage for livestock feed ranks second (NASS 2002, a, b, c). The majority of the ranchers use the H-T NF and BLM-administered lands for cattle and sheep grazing for a portion of the year to graze their livestock.

Oil and Gas. In Nevada, oil production is limited to Nye and Eureka Counties, with most of the production coming from Railroad Valley in Nye County. Since 1954, when production in Railroad Valley began, oil and gas exploration and production has been and continues to be important to the economy of East-Central Nevada. In 2005, the oil production from Railroad Valley was approximately 400,000 barrels, down from the production of 3.6 million barrels produced in 1990 (NDOM 2006, b).

The nearest oil fields to the Project Area are located in Railroad Valley, and, consequently, most of the workers employed in oil and gas operations and exploration are Nye County residents (NDOM 2006, b). In 2003, 139 workers were employed in oil exploration and extraction industry and 140 were employed in the refining industry within Nevada. (IPAA, 2005).

Oil and gas companies that have operations or leases in the Railroad Valley area provided comment on their ongoing operations in Railroad Valley (Pierce, personal communication, 2006) for this EIS. Generally, from 10 to 15 people are employed at each well site, and these employees conduct both exploration and development operations. A range of employees, from managers and engineers to

pumpers and roughnecks, are employed at salaries from \$15 to \$50 per hour, which does not count benefits. Specialists can earn up to \$700 per day (Pierce, personal communication, 2006). The employees are primarily from outside the area, and have background experience in the oil and gas industry. However, support services such as machinery repair are obtained from the local businesses.

The Foreland Corporation refinery in Railroad Valley is the only refinery within Nevada. Its refining capacity is approximately 1,700 barrels per day (Energy Information Statistics 2006). Currently, all oil produced in Nevada is shipped to this refinery for processing. If production of oil increases significantly some oil might be shipped out of state for refining if the capacity of this refinery is exceeded (Horsely, personal communication, 2006).

The recent oil price increase, from a low of \$12 per barrel in 1999 to over \$70 per barrel in 2006, has caused an increase in gas and oil exploration. The increase in the price of oil has led to new interest in leasing and drilling throughout Nevada.

5.6.5. Fiscal Considerations

Oil producers pay a royalty to the Federal government based on the amount of production. A portion of the royalty goes back to the state and county where production occurs. These royalty payments are a significant source of income for the state of Nevada and Nye County. The oil and gas industry is currently a large contributor to the Nye County economy.

Even though there has been a decrease in the number of barrels produced, revenue from the oil production has increased because of the dramatic rise in the price of oil.

A portion of revenue generated through Federal oil and gas lease sales, rentals, and royalties is shared with the State. The portion is equal to 50 percent of all revenue from the above activities. The Nevada Revised Statutes (NRS 328.450) mandates that:

1. The State Treasurer shall deposit in the State Distributive School Account in the State General Fund money received in each fiscal year pursuant to 30 U.S.C. § 191 in an amount not to exceed \$7,000,000.
2. Any amount received in a fiscal year by the State Treasurer pursuant to 30 U.S.C. § 191 in excess of \$7,000,000 must be deposited in the Account for Revenue from the Lease of Federal Lands, which is hereby created.
3. The interest and income earned on the money in the Account, after deducting any applicable charges, must be credited to the Account.

The statutes (NRS 328.460) also state that,

The State Controller shall apportion money in the Account for Revenue from the Lease of Federal Lands as follows:

1. Twenty-five percent to the State Distributive School Account in the State General Fund.
2. Seventy-five percent to the counties from which the fuels, minerals and geothermal resources are extracted. Of the amount received by each county, one-fourth must be distributed to the school district in that county.

NRS 328.470 states that: Account for Revenue from Lease of Federal Lands: Money payable to counties.

1. The State Controller shall ascertain from the reports received by the State Treasurer the portion of money in the Account for Revenue from the Lease of Federal Lands attributable to activities in each county and apportion the money payable to counties accordingly.

2. All money received:

(a) By the County Treasurer pursuant to this section must be deposited in the general fund of the county or the county school district fund, as the case may be; and

(b) By a county or school district must be used for:

(1) Construction and maintenance of roads and other public facilities;

(2) Public services; and

(3) Planning.

5.6.6. Forest Management Direction

Socio-economics are determined by people within a community, and are not a resource that is directed by the Forest Service. However, the Forest Service can support community economics through the provision of employment directly through the Forest Service or indirectly by providing opportunities to use Forest resources for economic gain.

5.6.7. Sensitive Resource Components

Local populations, rates of employment, local businesses and revenues to counties are considered the sensitive resource components of the socio-economic

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CHAPTER FOUR: ENVIRONMENTAL CONSEQUENCES

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1. IMPACTS TO ECOLOGICAL INTEGRITY AND BIOLOGICAL DIVERSITY

A comparison of alternatives according to each resource may be found in Chapter 2, Table 2-4. The table provides acres for each resource and lease stipulations. In addition, Chapter 2 Tables 2-5 and 2-6 provide total acres for each alternative according to proposed lease stipulation.

1.1. General Effects

Human activities have the potential to alter ecosystems. For activities related to the Proposed Action, direct effects of road and drill pad construction result in soil disturbance, vegetation removal, and may cause excessive sedimentation in streams and a disruption of natural flow. Wildlife, fish, and birds may be stressed and displaced. Key summer and winter range and forage may be altered or removed.

These changes have indirect effects on certain components of the ecosystem. For example, following ground disturbance, noxious weeds may invade native plant communities altering habitats for rare plant and animal species, with a possible corresponding change in natural fire regimes.

An increase in road density within the project area increases the potential for disturbance by humans. This can cause fragmentation and a loss of connectivity of the habitat as wildlife may use areas less because of the disturbance. In addition, off road use increases the amount of access. These can decrease the quality of the habitat for many wildlife and plant species.

1.1.1. Alternative 1: No Action

There would be no change to the current level of biodiversity or ecological integrity in the analysis area.

1.1.2. Alternative 2: *Forest Plan with Maximum Protection*

This alternative would provide the most protection to all the ecosystem components which could be affected by this alternative, and would have the least effect overall to biodiversity and ecological integrity. The effects would be minimized by the stipulations that would be applied to the other resource areas under this alternative. Fragmentation of habitats would be minimal and habitat connective ness would be maintained. Habitat connective ness is maintained through protection of riparian corridors and by the reduction in overall road density after the implementation of this alternative. Minimal fragmentation would occur through the protection of greater sage-grouse and big game habitat; hence, species viability or persistence would be unaffected.

1.1.3. Alternative 3: *Forest Plan with Moderate Protection*

This alternative would provide some protection to all the ecosystem components that could be affected by this alternative, but could have a moderate overall negative effect to biodiversity and ecological integrity. Some fragmentation of habitats would occur and habitat connective ness may be altered. These effects would be somewhat minimized by the stipulations that would be applied to the other resource areas under this alternative, although to lesser extent than Alternative 2.

1.1.4. Alternative 4: Forest Plan

This alternative would provide the least protection to all the ecosystem components that could be affected by this alternative, and would have the most impacts to biodiversity and ecological integrity. The stipulations applied to other resource areas would have fewer restrictions, therefore allowing for greater potential impacts. Under this alternative there is the potential to have most construction occur, leading to the greatest amount of soil disturbance, vegetation removal, and sedimentation in streams, which could lead to the greatest amount of fragmentation of habitats and loss of habitat connective ness.

1.1.5. Cumulative Effects

Cumulative effects to ecological integrity and biodiversity may result from the combination of past, present, and future livestock grazing, wild horse management, recreation uses (such as hunting and dispersed camping, fuel wood harvest, road maintenance, mineral exploration, and the proposed oil and gas exploration). There are other activities that may occur on the Project Area that are not addressed above, but these describe the major activities that are most likely to continue to occur regularly in the future. The cumulative impacts on ecological integrity and biodiversity from these activities coupled with oil and gas exploration activities are very difficult to assess. This assessment involves estimation of the extent of ongoing and proposed activities in relation to potential oil and gas exploration activity in the future. Large-scale oil and gas exploration in addition to past, present, and future activities could result in negative impacts to the ecological integrity and biodiversity of the area. The cumulative effects of such changes may reduce population numbers and viability of native species, and the composition and structure of native plant communities. Depending on the extent of the changes, this may negatively affect overall biodiversity and compromise ecosystem integrity.

Under Alternatives 1 and 2, no impacts are anticipated to the ecological integrity and biodiversity of the area. Under Alternatives 3 and 4, some loss or disturbance of ecological integrity and biodiversity could occur. If the areas affected by oil and gas exploration and production are small, measurable cumulative affects are very unlikely. Unique habitats are likely to be adequately protected by Standard Lease Terms (SLT). The exceptions to this determination would be if large areas are leased for oil and gas exploration, and oil and gas reserves are found. This would increase the amount of area impacted and could result in negatives impacts to ecological integrity and biodiversity.

1.2. Impacts to Threatened and Endangered Species (TES) and Sensitive Species

1.2.1. Threatened and Endangered Species (TES)

The Endangered Species Act of 1973, as amended, provides for protection and mitigation of impacts to federally-listed endangered, threatened, and proposed species. Impacts to federally-listed species are unlikely under any of the proposed alternatives because no known federally-listed species occur on the Project Area. Hence, no impacts are expected to any threatened or endangered species and they will not be discussed further. Should threatened or endangered species, or critical habitat for these species, be identified at a later date on leased lands, a lease notice would be attached to the lease to inform the lessee of the presence of such species or habitat for such species. Protection of these species and their habitat would be ensured through the ESA rather than a lease stipulation.

The Forest Service requires a Biological Assessment/Biological Evaluation (BA/BE) of potential effects to all federally-listed and proposed species and USFS Regional Sensitive Species for every proposed project. The wildlife biologist prepared a BA/BE, which is located in the Project File. Below is a summary of the findings from this analysis.

1.2.2. Sensitive Species

Forest Service regionally sensitive species are not afforded equal protections as federally-endangered and threatened species. However, the Forest Service Manual direction, as described in Chapter 3, requires the Forest Service to consider effects on these species and take steps to protect them.

1.2.2.1. Greater Sage-Grouse

General Effects

Critical greater sage-grouse habitat includes traditional breeding/strutting grounds (leks), nesting, brooding rearing, and summer and winter habitat. Any oil and gas activities that result in the disturbance of leks would result in significant effects to greater sage-grouse. Alteration of sagebrush habitat utilized by greater sage-grouse at any time of the year may also cause population declines or abandonment of this habitat. This habitat includes sagebrush communities that are used for mating, nesting, brooding rearing, and summer and winter habitat. Prior to ground-disturbing activities, survey should be conducted and leks should be identified and avoided. (USDI Bureau of Land Management Draft Resource Management Plan for the Ely District, May 2006) recommend protection of all sagebrush within a 3-kilometer radius of a lek.

Alternative 1: No Action

Alternative 1 would result in no effects to greater sage-grouse.

Alternative 2, 3, and 4: All Action Alternatives

In these alternatives, a NSO stipulation would prevent well pads from being constructed on lek sites. Leks have been identified and account for 22,605 acres of greater sage-grouse habitat within the Project Area in the White Pine Division. A Timing Limitation from March 15 to July 15 on 82,880 acres of nesting and early brood-rearing habitat would preclude activities during these key periods of use. A CSU stipulation would apply to 74,060 acres of summer habitat. This would reduce the number of disturbances allowed within the summer habitat at any one time.

However, NSO would not apply to access roads, pipelines, or power lines and greater sage-grouse habitat could be lost within the TL and CSU areas. The magnitude of impacts would depend on the site-specific situations. Despite the occupation of some habitat, breeding and nesting would likely still occur with minimal disruption. However, adverse effects may be incurred by direct loss of habitat and increased disturbances.

1.2.2.2. Pygmy Rabbit

Alternative 1: No Action/No Lease

Alternative 1 would result in no effects to pygmy rabbits.

Alternative 2: Forest Plan with Maximum Protection

Under Alternative 2, a NSO stipulation would be applied to restrict new surface-disturbing activities in areas where burrow sites have been found. Surveys would then determine the location of any burrow sites within an area to be leased. This stipulation would reduce direct impacts to pygmy rabbits.

Alternative 3: Forest Plan with Moderate Protection and Alternative 4: Forest Plan

Under these alternatives SLT would be applied to the areas available for oil and gas exploration. The SLT offers little protection from direct impacts of oil and gas exploration activities. If large-scale activities result from oil and gas leasing, some pygmy rabbit sites are likely to be affected. Site-specific mitigation of known burrow locations may limit some of the direct impacts, although over time burrow sites may be subject to impacts if many areas are leased in the Project Area.

1.2.2.3. Northern Goshawk and Flammulated Owl (Raptors)**General Effects**

Although the physical destruction of active raptor nests is illegal under Federal law, indirect effects could occur from oil and gas exploration activities in the vicinity of active raptor nests. Young and Bechard (1994) found no significant difference in diet, habitat use, nest productivity, or nest abandonment rates between nesting pairs of northern goshawks exposed to mining activity and undisturbed nesting pairs. However, they found undisturbed pairs tended to be more productive over time. Human activities have caused incubating adult raptors to leave nests, resulting in the loss of eggs or small chicks, or nest abandonment. Raptors such as eagles, hawks, and owls are typically sensitive to disturbance, although sensitivity varies by species, type and duration of disturbance, and time of year. Many species of raptors will tolerate disturbance in foraging areas, but will not tolerate any disturbance near nest locations. Raptor species may variably habituate to human activities and often construct nests in locations where recurring non-threatening human activity occurs, such as along a road. In addition, the prey base and foraging habitat quality for raptors are likely to decline as a result of oil and gas exploration activities. All the locations of raptor nesting in the Project Area have not been identified. Moreover, these locations are likely to change from year to year due to weather condition, natural disturbance, nest site fidelity, and other factors.

Alternative 1: No Action/No Lease

Alternative 1 would result in no effects to raptors.

Alternative 2: Forest Plan with Maximum Protection

Under Alternative 2, a NSO stipulation would be applied to restrict new surface-disturbing activities within raptor nesting habitat. This stipulation will establish an 800-meter buffer from all known nests (17,033 acres). This limitation does not restrict the construction of new roads off-lease to access exploratory drill sites. Restricting construction of permanent features would provide adequate protection of nesting areas in general and limit impacts to foraging habitat for most raptor species. Site-specific mitigation measures for known nesting sites could be applied to further limit impacts to raptor nesting.

Direct and indirect impacts could occur to raptor nesting and foraging habitat from construction and use of access roads and pipelines off lease. However, consultation regarding the location of access roads could greatly reduce any potential impacts.

Alternative 3: Forest Plan with Moderate Protection

Under Alternative 3, a CSU stipulation would be applied to known nesting areas to restrict any disturbance within 800 meters of occupied nest locations (17,033 acres). This stipulation would provide a moderate level of resource protection by limiting the amount of human activity and number of wells occurring near known nests at any one time.

NSO stipulations under Alternative 3 also provide protection for nesting raptors. These protections would include stipulations for the following resources: lek buffers, bristlecone pine, riparian areas, slopes greater than 40 percent, three selected roadless areas, primitive recreation opportunity spectrum areas, VQO retention areas, recreation areas, and administrative sites. These NSO stipulations would exclude any oil and gas operations from occurring within these areas that provide nesting raptor habitat.

In addition, CSU stipulations for other resources would offer some overlapping protections for raptor nesting and foraging habitats that are not presently identified. This protection would accrue from stipulations for sage grouse summer habitat; raptor nesting buffers; elk and mule deer winter range; bighorn sheep habitat; mountain mahogany, aspen, sub-alpine habitats; slopes between 25 and 40 percent; all other roadless areas; semi-primitive non-motorized ROS; partial retention VQO (Tables 2-2). These CSU stipulations would limit the overall level of disturbance including restricting the number of concurrent oil and gas operations that would occur within these areas during any given time.

This alternative may result in direct and indirect impacts to nesting areas and habitat. Not all raptor nests may be found within an area to be leased. This could lead to disturbance to nesting birds and loss of habitat from construction activities.

Alternative 4: Forest Plan

Under Alternative 4, SLT would be applied to the areas available for oil and gas exploration. The *Forest Plan* does not include specific restrictions or protective measures for raptor species. However, riparian area management standards and guidelines emphasize protection of wet areas around springs and set standards for riparian habitat management along perennial streams. These habitats tend to be areas of concentration for a majority of raptor species nesting and foraging. In addition, timber management direction emphasizes management and regeneration of mature aspen stands, which also benefits many of the raptor species that occur in the Project Area.

NSO stipulations under Alternative 4 also provide protection for nesting raptors. These protections would include stipulations for the following resources: lek buffers, bristlecone pine, riparian areas, primitive recreation opportunity spectrum areas, VQO retention areas, recreation areas, and administrative sites. These NSO stipulations would exclude any oil and gas operations from occurring within these areas that provide nesting raptor habitat.

In addition, CSU stipulations for other resources would offer some overlapping protections for raptor nesting and foraging habitats that are not presently identified. This protection would accrue from stipulations for sagegrouse summer habitat; bighorn sheep habitat; sub-alpine habitats; slopes greater than 25 percent; and partial retention VQO (Tables 2-2). These CSU stipulations would limit the overall level of disturbance including restricting the number of oil and gas operations that would occur within these areas during any given time.

The combination of SLT and *Forest Plan* direction offers minimum protection from direct impacts of oil and gas exploration activities. If activities are large scale, many raptor species are likely to be affected. Site-specific mitigation of known raptor nesting areas may limit some of the direct impacts, although over time many raptors species may still be subject to significant impacts in the Project Area.

1.2.2.4. Peregrine Falcon, Bats, Three-toed Woodpecker

Alternative 1: No Action/No Lease

Alternative 1 would result in no effects to peregrine falcons, Townsend's big-eared bat, spotted bat, and three-toed woodpecker.

Alternative 2, 3, and 4: All Action Alternatives

SLT would apply to these sensitive species or their habitats within the boundary of proposed lease operations. This stipulation would permit mitigation measures involving delaying oil and gas operation up to 60 days and/or moving drilling operations up to 200 meters in order to avoid and minimize potential affects to sensitive species and their habitats. These four sensitive species can be tied to specific types of habitats. Peregrine falcons and spotted bats prefer cliffs for nesting and roosting; Townsend's big-eared bats prefer caves/mines; and three-toed woodpeckers prefer spruce forest and/or burned forest areas. These habitat types are not likely to be impacted from oil and gas leasing activities or would be covered under stipulations already in place for other resources. The amount of foraging habitat acreage impacted by oil and gas leasing would also be minimal. Therefore minimal impacts are expected to any of these sensitive species from the proposed activities.

1.2.2.5. Forest Service Sensitive and State of Nevada Rare Plants

There are 16 sensitive plants from the Region 4 Regional Forester's Sensitive Species list that are known, or have the potential of occurring, within the White Pine and Grant-Quinn Divisions. Rare or sensitive plants for the State of Nevada are found on the Nevada Natural Heritage Sensitive and Watch lists. Habitats for these plants within the Project Area include high elevation mountain areas, riparian, and sagebrush habitats. Few surveys have been completed within the Project Area.

Alternative 1: No Action/No Lease

Alternative 1 would result in no effects to Forest Service Sensitive and State of Nevada Rare plants.

Alternative 2: Forest Plan with Maximum Protection and Alternative 3: Forest Plan with Moderate Protection

Under Alternative 2 and 3, a NSO stipulation would be applied to restrict new surface-disturbing activities in areas of occupied habitat. Surveys would need to be conducted to determine the location, if any, of additional sites within an area to be leased. This stipulation would reduce direct impacts to sensitive and rare plants.

Alternative 4: Forest Plan

SLTs would apply to all occupied habitat of sensitive and rare plant species found within the boundary of proposed lease operations. This stipulation would permit mitigation measures involving delaying oil and gas operation up to 60 days and/or moving drilling operations up to 200 meters from occupied habitat in order to avoid and minimize potential affects to sensitive plants. In addition, stipulations for other

resources would offer some overlapping protections for sensitive plant populations occurring within them. These include: the withdrawal from leasing in Wilderness; the NSO stipulation on greater sage-grouse leks, within bristlecone pine stand, riparian areas, Primitive ROS, Retention VQO, and administrative/recreation sites; and the CSU stipulation applied to summer habitat for greater sage-grouse use, bighorn sheep habitat, Great Basin sub-alpine vegetative type, slopes greater than 25 percent, and Partial Retention VQO.

1.2.2.6. Cumulative Effects To Threatened and Endangered Species, and Sensitive Species

Wildlife

Cumulative effects to sensitive wildlife species may result from the combination of past, present, and future livestock grazing; wild horse management; recreation uses such as hunting, off-highway vehicle use, and dispersed camping; fuel wood harvest; road construction and maintenance; mineral exploration; and the proposed oil and gas exploration. These often lead to the fragmentation of habitat as well as the introduction and spread of noxious and invasive weed species. There are other activities that may occur on the Project Area that are not addressed above, but these describe the major activities that are most likely to continue to occur regularly in the future. The cumulative impacts from these activities coupled with oil and gas exploration would involve estimation of the extent of ongoing and proposed activities in relation to potential oil and gas exploration activity in the future. Large-scale oil and gas exploration in addition to past, present, and future activities could result in negative impacts to sensitive species wildlife populations. Under all action alternatives, some loss or disturbance to wildlife species could occur if the species' habitat is present within the lease area. If the areas affected by oil and gas exploration and production are small, measurable cumulative effects are very unlikely. Unique habitats and sensitive time periods for wildlife species are likely to be adequately protected by SLT and lease stipulations, except where large areas are leased for oil and gas exploration and oil and gas reserves are found. This would increase the amount of area impacted and could result in negative impacts to sensitive species wildlife.

Plants

Cumulative effects to sensitive plant species may result from the combination of past, present, and future livestock grazing; wild horse management; recreation uses such as hunting, off-highway vehicle use, and dispersed camping; fuel wood harvest; road construction and maintenance; mineral exploration; and the proposed oil and gas exploration/development. The cumulative impacts on sensitive plants from these activities coupled with oil and gas exploration activities would involve estimation of the extent of ongoing and proposed activities in relation to potential oil and gas exploration activity in the future. Many of the sensitive plant species are located in areas not likely to be leased for oil and gas exploration. Large-scale oil and gas exploration in addition to past, present, and future activities could result in negative impacts to sensitive plant populations. Under Alternatives 1, 2 and 3, minimal impacts are anticipated for sensitive plant species. Under Alternative 4 some loss or disturbance of sensitive plant species could occur if suitable habitat for these species is present within the lease area. If the amount of lease activity is small and/or if the amount of acreage is small, measurable cumulative affects are very unlikely. Unique habitats and sensitive time periods for sensitive plant species are likely to be adequately protected by SLT; except where large areas are leased for oil and gas exploration, and oil and gas reserves are found and developed. This would increase the amount of area impacted and could result in negative impacts to sensitive plants.

1.3. Impacts to Wildlife Sensitive Resource Components

1.3.1. Big Game Habitat - Bighorn Sheep, Mule Deer, and Elk

General Effects

Many animals have well defined and often extremely tight energy budgets (Wickstrom et al. 1984; McCorquodale 1991). Human disturbances are known to have a metabolic cost associated with them (Kucera and McCarthy 1988; Van Dyke and Klein 1996). Deviations from normal activity patterns and habitat use raise the energy cost of living often at the expense of energy needed for reproduction and growth. These costs may take the form of: (1) physiological excitement, (2) locomotion, (3) lost food intake, (4) sub-optimal habitat selection (Bromley 1985). Winter range is critical to big game populations because it typically provides cover for security, ample forage, and limited accessibility by humans during this vulnerable time of year. Direct loss of habitat occurs from clearing of vegetation for well pads, roads and pipelines. Perhaps the largest impact on wintering big game is disturbance by increased human activity and noise. Big game animals often move away from a disturbance to other habitat, or alter their activity patterns. The extent of impact is difficult to predict because of site-specific variables such as visibility and hiding cover, tolerance of the individual animals, timing and type of disturbance, time of day, and other factors. In general, effects tend to be greatest during the construction and drilling phase when the level of human activity is highest (Bromley 1985). Disturbance and displacement of deer and elk caused by road traffic, logging, and other facilities reported in the literature typically vary between 200 to 1,000 meters (656 to 3,281 feet).

Alternative 1: No Action/No Lease

Alternative 1 would result in no effects to bighorn sheep, mule deer, or elk.

Effects common to all Action Alternatives

The following paragraphs describe how the various stipulations affect big game. Not all stipulations are applied in all alternatives.

No Lease

NL on big game habitat would generally limit most negative effects from oil and gas exploration and development. However, there could be loss of big game habitat suitability on the perimeter of the lease areas where adjacent lands have different ownerships and stipulations.

No Surface Occupancy

NSO is specifically proposed only for bighorn sheep habitat. However, NSO stipulations for other resources overlapping with big game habitat would prevent many well pads from being constructed. NSO would not apply to access roads, pipelines, and power lines, etc. (see Appendix A). Therefore, big game habitat could be impacted, resulting in direct loss of habitat. Big game could be displaced from preferred, optimum, or secure habitats to marginal habitats lacking the habitat conditions necessary for survival. However, impacts may be somewhat mitigated since proposals for roads and pipelines would be governed by standards and guidelines in the *Forest Plan*.

Controlled Surface Use

A CSU stipulation would restrict the number of concurrent operations (wells being drilled) at any given time. Disturbance could take place in big game habitats along with the associated impact to big game, such as direct habitat loss, fragmentation of habitats, loss of habitat effectiveness, displacement of big game to less favorable habitats, and increased hunting pressure. However, with a CSU stipulation the magnitude of disturbance-related impacts would be lessened because of the restriction on the amount of human activity/disruption at any one time.

Timing Limitations

TL stipulations would preclude oil and gas activities in specified big game winter range during key winter periods from December 1 to April 1, and in elk calving areas from April 1 to June 15. Although TL stipulations would minimize disruptions during these critical wintering and calving periods, some habitats would be lost.

Standard Lease Terms

SLT would not protect big game habitats. This could result in the direct loss and fragmentation of habitat from the construction of roads, well pads and pipelines; reduced habitat effectiveness resulting from human activity/disruptions; possible displacement of big game from preferred, optimum or secure habitats to marginal habitats lacking the habitat conditions necessary for survival and reproduction; and possible increase in hunting pressure from increased road access.

Alternative 2: Forest Plan with Maximum Protection

Under Alternative 2, a TL stipulation would be applied to 49,329 acres of elk winter range, 106,029 acres of mule deer winter range, and 18,819 acres of elk calving areas; and a NSO stipulation would be applied to 120,306 acres of bighorn sheep habitat. Within the White Pine Range, 82,880 acres of greater sage-grouse nesting and early brood rearing habitat would have TL from March 15 until July 15 when oil and gas activities would not be allowed, and 74,060 acres of greater sage-grouse summer range would have CSU in which the amount of oil and gas activities within these areas would be limited at any given time. These restrictions, along with Wilderness, provide a higher level of protection for big game in comparison with other alternatives by preventing the oil and gas construction activities on critical deer and elk wintering and calving and fawning areas during critical periods and limiting the construction of specified structures in bighorn sheep summer and winter range.

With NSO, direct and indirect impacts from construction and use of access roads and pipelines could occur to big game winter and summer range and calving areas. The TL would therefore provide greater protection against direct impacts to critical deer and elk winter range and elk calving/deer fawning areas. In general, deer and elk summer range in the Project Area is at higher elevation and in steeper inaccessible portions of the Project Area. However, direct impacts to bighorn sheep are likely to occur whenever exploratory activities are within sight of occupied sheep habitat. Indirect impacts would also occur in instances where activities occur near suitable sheep habitat by disrupting normal use patterns and occupancy.

Alternative 3: Forest Plan with Moderate Protection

Under Alternative 3, a CSU stipulation would be applied to 49,329 acres of elk winter range, 106,029 acres of mule deer winter range, and 120,306 acres of bighorn sheep habitat. Within the White Pine Range 82,880 acres of sage grouse nesting and early brood rearing habitat would have TL from March 15

until July 15 when oil and gas activities would not be allowed. A total of 74,060 acres of greater sage-grouse summer range has CSU in which the amount of oil and gas activities within these areas would be limited at any given time. These restrictions, along with Wilderness, would provide a moderate level of resource protection by limiting the amount of human activity and number of wells occurring in big game habitat at any one time. Elk calving areas have a SLT (18,819 acres). This alternative may result in both direct and indirect impacts to big game populations and habitat. The area available for oil and gas exploration is relatively small in comparison to the entire Project Area. However, depending on the quantity, timing, and extent of exploratory activities, this alternative could significantly affect big game populations and habitat or have relatively little impact. Most likely big game species would adapt to changes in land use and suffer minimal reductions in population and available habitat.

Alternative 4: Forest Plan

Under Alternative 4, a SLT would be applied to the big game areas available for oil and gas exploration, with the exception of bighorn sheep habitat, which would still receive a CSU and Wilderness. In addition, within the White Pine Range, 82,880 acres of sage grouse nesting and early brood rearing habitat would have TL from March 15 until July 15 when oil and gas activities would not be allowed, and 74,060 acres of sage grouse summer range has CSU in which the amount of oil and gas activities within these areas would be limited at any given time. *Forest Plan* direction specifically related to big game include (1) restrict oil and gas exploration and development activities in key big game habitat, (2) protect key desert bighorn sheep winter habitat in Irwin and Troy Canyons and Little Meadows, and (3) big game winter ranges will be maintained at current production levels.

It is likely that both direct and indirect impacts would occur if this alternative is selected. Mule deer and elk populations and habitat could be impacted to varying degrees depending on the quantity, timing, and extent of exploratory activities. These species would most likely adapt to changes in land use and suffer minimal reductions in population and available habitat.

1.3.2. Neotropical Migratory Birds

General effects

The Breeding Bird Survey shows that certain neotropical migrant songbird populations have been declining over the past 26 years. Although the reasons for these declines are not completely understood for all species, fragmentation and destruction of nesting and wintering habitat are likely the greatest cause of neotropical migrant bird population declines. Oil and gas exploration activities could directly and indirectly affect neotropical migratory birds. Physically impacting nesting birds or disturbing nesting activities could affect populations, if the impacts are broad scale across the Project Area. In addition, lighted features such as radio/television towers have been shown to cause catastrophic mortality of birds migrating at night, especially during storm events. In this instance, migrating birds could possibly be attracted to lighted drilling equipment and other structural features. Surveys were not conducted to determine the species, distribution, or number of neotropical migratory birds occupying the different portions of the Project Area.

Alternative 1: No Action/No Lease

Alternative 1 would result in no effects to neotropical migratory birds.

Alternative 2: Forest Plan with Maximum Protection

Under Alternative 2, a TL from May 1 until July 31 would restrict new surface-disturbing activities within nesting habitat. This stipulation would offer site-specific protection during nesting. In addition, stipulations for other resources would offer some overlapping protection for migratory bird nesting and foraging habitats. An area proposed for leasing during nesting season would need to have surveys completed to determine nesting activity.

Direct and indirect impacts could occur to the nesting and foraging habitat from construction of well pads, access roads, and pipelines, which would remove potential nesting and foraging habitat from use.

The habitat loss from exploration activities would be short term (3 to 5 years); and following successful reclamation, the habitat would return to productive habitat. Habitat loss from oil and gas development/production may be greater than 10 years.

Alternative 3: Forest Plan with Moderate Protection

Under Alternative 3, SLT would be applied to the areas available for oil and gas exploration. The *Forest Plan* does not include specific restrictions or protective measures for neotropical migratory birds. Riparian habitats are often areas of concentration for neotropical migratory bird species for nesting and foraging. The NSO and CSU stipulations for riparian habitats and other resources would offer additional protection for nesting and foraging habitats.

NSO stipulations under Alternative 3 also provide protection for neotropical migratory birds. These protections would include stipulations for lek buffers, bristlecone pine, riparian areas, slopes greater than 40 percent, three selected roadless areas, primitive recreation opportunity spectrum areas, VQO retention areas, recreation areas, and administrative sites. These NSO stipulations would exclude any oil and gas operations within these areas that provide nesting raptor habitat.

In addition, CSU stipulations for other resources would offer some overlapping protections for neotropical migratory birds nesting and foraging habitats that are not presently identified. This protection would include stipulations for greater sage-grouse summer habitat; raptor nesting buffers; elk and mule deer winter range; bighorn sheep habitat; mountain mahogany, aspen, sub-alpine habitats; slopes between 25 and 40 percent; all other roadless areas; semi-primitive non-motorized ROS; and partial retention VQO (Tables 2-2). These CSU stipulations would limit the overall level of disturbance including restricting the number of concurrent oil and gas operations that would occur within these areas during any given time.

The combination of Standard Lease Terms, *Forest Plan* direction, and NSO/CSU protection for other resources offers adequate protection from direct impacts of oil and gas exploration activities. Exploration is expected to directly impact up to 360 acres and the projected disturbance from development is estimated at 34 acres. These activities may result in some unintentional impacts to neotropical migratory bird species. Site-specific mitigation of known nesting areas may limit some of the direct impacts.

Alternative 4: Forest Plan

Under Alternative 4, SLT would be applied to the areas available for oil and gas exploration. The *Forest Plan* does not include specific restrictions or protective measures for neotropical migratory birds. Riparian habitats are often areas of concentration for neotropical migratory bird species for nesting and foraging. The NSO and CSU stipulations for riparian habitats and other resources would offer additional protection for nesting and foraging habitats.

NSO stipulations under Alternative 4 also provide protection for neotropical migratory birds. These protections would include stipulations for lek buffers, bristlecone pine, riparian areas, primitive recreation opportunity spectrum areas, VQO retention areas, recreation areas, and administrative sites. These NSO stipulations would exclude any oil and gas operations within these areas that provide migratory bird habitat.

In addition, CSU stipulations for other resources would offer some overlapping protections for raptor nesting and foraging habitats that are not presently identified. Protection under Alternative 4 would accrue from stipulations for sage grouse summer habitat; bighorn sheep habitat; sub-alpine habitats; slopes greater than 25 percent, and partial retention VQO (Tables 2-2). These CSU stipulations would limit the overall level of disturbance, including restricting the number of concurrent oil and gas operations that would occur.

The combination of SLT, *Forest Plan* direction, and NSO/CSU protection for other resources offers minimum protection from direct impacts of oil and gas exploration activities. Exploration is expected to directly impact up to 360 acres and the projected disturbance from development is estimated at 34 acres. These activities may result in some unintentional impacts to neotropical migratory bird species. Site-specific mitigation of known nesting areas may limit some of the direct impacts.

1.3.3. Other Raptor Species

General Effects

Although the physical destruction of active raptor nests is illegal under Federal law, indirect effects could occur from oil and gas exploration activities in the vicinity of active raptor nests. Human activities have also been shown to cause incubating adult raptors to leave nests, resulting in the loss of eggs or small chicks, or nest abandonment. Raptors, such as eagles, hawks, and owls are typically sensitive to disturbance, although sensitivity varies by species, type and duration of disturbance, and time of year. Many species of raptors will tolerate disturbance in foraging areas, but will not tolerate any disturbance near nest locations. Raptor species may variably habituate to human activities and often construct nests in locations where recurring non-threatening human activity occurs, such as along a road. All the locations of raptor nesting in the Project Area have not been identified. Moreover, these locations are likely to change from year to year due to weather condition, natural disturbance, nest site fidelity, and other factors.

Alternative 1: No Action/No Lease

Alternative 1 would result in no effects to raptors.

Alternative 2: Forest Plan with Maximum Protection

Under Alternative 2, a NSO stipulation would be applied to restrict new surface-disturbing activities within raptor nesting habitat. This stipulation will establish an 800-meter buffer from all known nests. This limitation does not restrict the construction of new roads off lease to access exploratory drill sites. Restricting construction of permanent features would provide adequate protection of nesting areas in general and limit impacts to foraging habitat for most raptor species. Site-specific mitigation measures for known nesting sites could be applied to further limit impacts to raptor nesting.

Direct and indirect impacts could occur to raptor nesting and foraging habitat from construction and use of access roads and pipelines off lease. However, consultation regarding the location of access roads could greatly reduce any potential impacts.

Alternative 3: Forest Plan with Moderate Protection

Under Alternative 3, a CSU stipulation would be applied to known nesting areas to limit disturbance and activities within 800 meters of occupied nest locations. This stipulation would provide a moderate level of resource protection that includes limiting the amount of human activity and number of wells occurring near known nests any one time. In addition, CSU stipulations for other resources would offer some overlapping protections for raptor nesting and foraging habitats that are not presently identified.

This alternative may result in direct and indirect impacts to nesting areas and habitat. Not all raptor nests may be found within an area to be leased. This could lead to disturbance to nesting birds and loss of habitat from construction and operating activities.

Alternative 4: Forest Plan

Under Alternative 4, SLT would be applied to the areas available for oil and gas exploration. The Forest Plan does not include specific restrictions or protective measures for raptor species. However, riparian area management standards and guidelines emphasize protection of wet areas around springs and set standards for riparian habitat management along perennial streams. These habitats tend to be areas of concentration for a majority of raptor species nesting and foraging. In addition, timber management direction emphasizes management and regeneration of mature aspen stands, which also benefits many of the raptor species that occur in the Project Area.

The combination of SLT and Forest Plan direction offers little protection from direct impacts of oil and gas exploration activities. If activities are large-scale, many raptor species are likely to be affected. Site-specific mitigation of known raptor nesting areas may limit some of the direct impacts, although over time many raptor species may still be subject to significant impacts in the Project Area.

1.3.4. Cumulative Effects to Wildlife

Cumulative effects to wildlife may result from the combination of past, present, and future livestock grazing; wild horse management; recreation uses such as hunting, off-highway vehicle use, dispersed camping; fuel wood harvest; road maintenance and construction; mineral exploration; and the proposed oil and gas exploration and development.

There are other activities that may occur on the Project Area that are not addressed above, but these describe the major activities that are most likely to continue to occur regularly in the future. The cumulative impacts on wildlife from these activities coupled with oil and gas exploration and development activities are very difficult to assess, and involve estimation of the extent of ongoing and proposed activities in relation to potential oil and gas exploration activity in the future.

Large-scale oil and gas exploration in addition to past, present, and future activities could result in negative impacts to wildlife populations. Under Alternatives 1 and 2, minimal impacts are anticipated for species. Under Alternative 3 and 4 some loss or disturbance to wildlife species could occur if suitable habitat for these species is present within the lease area.

If the areas affected by oil and gas exploration and production are small, measurable cumulative affects are very unlikely. Unique habitats and sensitive time periods for wildlife species are likely to be adequately protected by SLT. The exceptions would be if large areas are leased for oil and gas exploration, and oil and gas reserves are found. This would increase the amount of area impacted and could result in negative impacts to wildlife.

1.4. Impacts to Aquatic and Riparian Ecosystems, including Streams and Surface Water Quality Sensitive Resource Components

1.4.1. Alternative 1: No Action/No Lease

Under the no-action alternative, there are no direct, indirect, or cumulative effects to aquatic or riparian ecosystems from oil and gas exploration or development activities, because no oil and gas leasing will occur. This alternative offers the greatest protection for aquatic and riparian ecosystems, compared to all other action alternatives.

1.4.2. Direct Effects Common to All Action Alternatives

All action alternatives have the NSO stipulation for riparian areas. *Forest Plan* S&Gs state that there should be no new road construction within riparian and aquatic ecosystems, including the 100-year flood plain, except road-stream crossings, or unless there is no other alternative for establishing the transportation corridor. Also, the NSO stipulation for riparian and aquatic ecosystems under all action alternatives permits construction of access roads, but does not permit construction of oil and gas exploration or development facilities (including drill pads, pipelines, well pads, and ancillary facilities) within these ecosystems. Therefore, direct effects to riparian and aquatic ecosystems from oil and gas exploration or development activities should be the same for all action alternatives, and should be limited to construction of new road-stream crossings and/or construction of roads currently located within riparian zones or the 100-year flood plain.

For the purposes of impact analysis, the maximum development (see Chapter 1, section 8) scenario assumes that all road reconstruction results in riparian habitat loss, and that the new roads must be constructed within the riparian corridor because no other alternative for the transportation corridor exists. Construction totals a maximum of 319 acres.

- 120 acres of existing road reconstruction (calculated from widening 5 miles of road by 10 feet for each well, and for a total of 20 wells) plus 180 acres due to new road construction for exploration activities (calculated from 3 miles of road, 25 feet wide, for each well, and for a total of 20 wells).
- 19 acres due to service and access road construction for oil field development (calculated from 3 miles of service road 30 feet wide, and 8 miles of access road widened by 10 feet).
- Increased sedimentation and decreased water quality within aquatic ecosystems due to increased erosion and stream bank disturbance during construction of road-stream crossings, and from vehicle traffic after construction.
- Temporary reduction in stream flows due to ground-water pumping.
- Degradation of ephemeral stream channels due to road construction and/or vehicular traffic.
- Loss of riparian habitat due to removal for reconstruction of existing roads or construction of new roads or road-stream crossings.

The reasonably foreseeable development scenario does not describe the number or extent of stream-road crossings that may need to be constructed for oil and gas exploration or development activities, or the amount of traffic generated by these activities. Therefore, it is not possible to predict the extent or magnitude of effects from increased sedimentation and decreased water quality within aquatic ecosystems

due to increased erosion and stream bank disturbance during construction of road-stream crossings, and from vehicle traffic after construction.

Based on the reasonably foreseeable development scenario, the extent of riparian habitat loss from road construction should be limited to no more than a total of 319 acres as described above. Assuming all 319 acres of riparian habitat were disturbed in one 6th Code Watershed, the magnitude of these effects would likely degrade riparian habitat at the site-specific scale. Again, this is considered the worst-case scenario, but is used for analysis purposes and is highly unlikely to occur. On a landscape scale, 319 acres of riparian habitat degradation due to direct effects would be considered minimal since 319 acres represents only about 1 percent of total riparian habitat within the Project Area.

It is assumed that existing road reconstruction, new road construction, and road-stream crossing construction activities will be designed to minimize extent and mitigate adverse effects of increased sediment to aquatic habitat and water quality, and loss of riparian habitat. Thus, the worst-case scenarios described above likely overestimate both the extent and magnitude of direct effects to riparian and aquatic ecosystems. A more accurate prediction of direct effects to riparian and aquatic ecosystems will need to be disclosed with environmental analysis of future, site-specific oil and gas exploration or development project proposals.

1.4.3. Alternative 2: Forest Plan with Maximum Protection

1.4.3.1. Indirect and Cumulative Effects

Riparian and aquatic habitat, including water quality, may be degraded due to indirect effects from oil and gas exploration and development activities, including erosion or mass wasting and sedimentation from upland areas disturbed by construction, hydrocarbon mud pit failures from drilling or well production, and hazmat spills.

Based on the reasonably foreseeable development scenario, and environmental effects described in the soils and hazmat sections of this document, there may be indirect effects from construction activities in uplands areas. The magnitude and probability for mud pit failures or hazmat spills will be considered in future site-specific project analysis. The extent of these indirect effects will depend on the location and distribution of oil and gas exploration or development activities.

Cumulative impacts are due to combined direct and indirect effects of oil and gas exploration or development activities with existing watershed disturbances, such as effects of fire, vegetation conversions, grazing, roads, off-highway vehicle use, road maintenance, mining, and water diversions. These combined effects cause changes in the amount and/or timing of runoff and sediment produced by a watershed, which brings about cumulative impacts within aquatic and riparian ecosystems. Potential cumulative effects include stream channel adjustments, such as down cutting, lateral migration or meander abandonment, loss of riparian habitat through erosion or lowered water tables, or chronic problems with degraded aquatic habitat and water quality due to stream instability. The magnitude and extent of cumulative effects will depend on watershed conditions and existing disturbances at the time that oil and gas exploration or development activities occur, which should be assessed in future site-specific project analysis.

Alternative 2 stipulates NSO of upland areas with high to very high erosion hazard and mass wasting potential. Thus, approximately 50 percent of the planning area is given increased protection from risk of erosion or mass wasting due to construction of oil and gas exploration or development facilities on steep slopes. Therefore, the potential magnitude for adverse indirect and cumulative effects is less for Alternative 2 compared to all other action alternatives, but is greater than the no-action alternative.

1.4.4. Alternative 3: Forest Plan with Moderate Protection

1.4.4.1. Indirect and Cumulative Effects

The types of indirect and cumulative effects are similar to those described for Alternative 2.

Based on the reasonably foreseeable development scenario, and environmental effects described in the soils and hazmat sections of this document, there may be indirect effects from construction activities in uplands areas. The magnitude and probability for mud pit failures or hazmat spills will be considered in future site-specific project analysis. The extent of these indirect effects will depend on the location and distribution of oil and gas exploration or development activities.

The magnitude and extent of cumulative effects will depend on watershed conditions and existing disturbances at the time that oil and gas exploration or development activities occur, which should be assessed in future site-specific project analysis.

Alternative 3 stipulates NSO of upland areas with very high erosion hazard and mass wasting potential, and Controlled Surface Use for upland areas with high erosion hazard and mass wasting potential. Thus, approximately 26 percent of the Project Area is given the greatest stipulation protection, and 24 percent is given moderate stipulation protection from risk of increased erosion or mass wasting due to construction of oil and gas exploration or development facilities on steep slopes. Therefore, the potential magnitude for adverse indirect and cumulative effects is less compared to Alternative 4, but is greater than the no-action alternative and Alternative 2.

The roadless area stipulations NL, NSO, and CSU give approximately 55 percent of the planning area in the Grant-Quinn Division and approximately 21 percent of the planning area in the White Pine Division a moderate level of protection. The remainder is given moderate stipulation protection. Therefore, the potential for adverse impacts with Alternative 3 is greater than for Alternative 2 and less than for Alternative 4.

1.4.5. Alternative 4: Forest Plan

1.4.5.1. Indirect and Cumulative Effects

The types of indirect and cumulative effects are similar to those described for Alternative 2.

Based on the reasonably foreseeable development scenario, and environmental effects described in the soils and hazmat sections of this document, there may be indirect effects from construction activities in uplands areas. The magnitude and probability for mud pit failures or hazmat spills will be considered in future site-specific project analysis. The extent of these indirect effects will depend on the location and distribution of oil and gas exploration or development activities.

The magnitude and extent of cumulative effects will depend on watershed conditions and existing disturbances at the time that oil and gas exploration or development activities occur, which should be assessed in future site-specific project analysis.

Alternative 4 stipulates Controlled Surface Use for areas with high to very high erosion hazard and mass wasting potential. Thus, approximately 50 percent of the planning area is given the minimal protection from risk of increased erosion or mass wasting due to construction of oil and gas exploration or development facilities on steep slopes. Therefore, the potential magnitude for adverse indirect and cumulative effects is greater than all other action alternatives and the no-action alternative.

The roadless area stipulation of SLT for Alternative 4 gives the least protection for the overall Project Area. Therefore, the potential for adverse impacts is greater than for all the other alternatives.

1.5. Impacts to Vegetation Communities and Sensitive Resource Components

1.5.1. Alternative 1: No Action/No Lease

There would be no change to any of the vegetation communities in the analysis area from oil and gas exploration.

1.5.2. Alternative 2: Forest Plan with Maximum Protection

Overall, there would be NSO in any of the critical vegetation types: mountain mahogany, Great Basin subalpine conifers, bristlecone pine, or riparian-aspen habitats. Activities not covered by NSO include geophysical exploration, roads, transmission, pipelines and power lines. Therefore, there could be minimal loss of some of the vegetation communities on a landscape scale from this alternative. However, a portion of these vegetation types are located in areas already protected by Wilderness designation and other areas that have restrictive stipulations.

1.5.3. Alternative 3: Forest Plan with Moderate Protection

Mountain Mahogany

Controlled Surface Use applies to those areas delineated as mountain mahogany in both Divisions (28,937 acres; includes Wilderness, which is withdrawn from the Proposed Action, so the acres are actually less). Activities would be limited where mountain mahogany occurs within bighorn sheep habitat or elk or mule deer winter range, or within buffer zones for other species. Assuming a maximum of 336 affected acres as described in the Proposed Action, 28,601 acres would remain relatively unaffected in the analysis area.

Riparian - Aspen

Controlled Surface Use applies to those areas delineated as riparian-aspen. This stipulation would provide a moderate level of resource protection by limiting the amount of human activity and number of wells occurring within aspen areas any one time. In addition, CSU stipulations for other resources would offer some overlapping protections for aspen areas. Aspen stands in riparian areas and stream buffer zones will be protected with NSO (refer to the Aquatic and Riparian Section). NSO applies to those areas delineated as riparian within stream buffer zones (583 acres). This total includes Wilderness, which is withdrawn from the Proposed Action, so the potentially affected acres are actually less.

This alternative may result in direct and indirect impacts to riparian-aspen areas because some use could be allowed within them. However, effects to riparian-aspen will be minimal.

Great Basin Sub-alpine

Controlled Surface Use applies to those areas delineated as Great Basin Sub-alpine. This vegetation community totals 38,170 acres, including Wilderness. Activities would be limited where these communities occur within bighorn sheep habitat, elk or deer winter range, or buffer zones for other species. Maximum acres affected in this cover type would be 336 leaving 37,834 acres with no effect. This total includes Wilderness, which is withdrawn from the Proposed Action, so the potentially affected

acres are actually less. This loss of Great Basin Sub-alpine community, one percent of the total acres, would be minimal.

Bristlecone Pine

A large portion of bristlecone pine stands are within the Wildernesses and protected by withdrawal from leasing. Outside of Wilderness, there will be NSO in bristlecone pine stands. Because the vegetation mapping used for this analysis makes no distinction for the bristlecone pine in the Great Basin Sub-alpine vegetation community, the actual locations of bristlecone forests need to be field verified at the exploration project stage.

1.5.4. Alternative 4: Forest Plan

Mountain Mahogany

Standard Lease Terms apply to those areas delineated in the GIS coverage as mountain mahogany in both Divisions (a total of 28,601 acres). This total includes Wilderness, which is withdrawn from the Proposed Action, so the potentially affected acres are actually less. Activities would be limited where mountain mahogany occurs within bighorn sheep habitat and where CSU and NSO apply. In all other areas, there would be minimal protection for mountain mahogany. The SLT allow for moving proposed activities 200 meters, or delaying 60 days. This would allow some protection of mountain mahogany stands, although the potential for loss could be minimal depending on the amount of oil and gas leasing that actually occurs.

Riparian - Aspen

Standard Lease Terms apply to those areas delineated as riparian-aspen; a total of 1,941 acres in the Project Area. This total includes Wilderness, which is withdrawn from the Proposed Action, so the potentially affected acres are actually less. Where these stands are within bighorn sheep or greater sage-grouse summer habitat the CSU stipulation will apply. Aspen occurring within riparian areas and stream buffer zones will be protected with No Surface Use (refer to the Aquatic and Riparian Section). In all other areas, there would be minimal protection for aspen under SLT. The SLT allow for moving proposed activities 200 meters and/or delaying 60 days. Aspen stands in the Project Area are small and widely separated. SLT, along with the stipulations for other resources, should protect the majority of the aspen areas, although the amount would depend on the amount of oil and gas leasing that actually occurs. Any loss of aspen habitat in the Project Area would have a negative impact to wildlife, plants, and biodiversity. This is the worst case scenario, and it is unlikely for all the oil and gas exploration activities to occur in this vegetation type.

Great Basin Sub-alpine

Controlled Surface Use applies to those areas delineated as Great Basin Sub-alpine. These cover types total 38,170 acres and includes Wilderness, which is withdrawn from the Proposed Action, so the potentially affected acres are actually less. Activities would be limited where these types occur within bighorn sheep habitat, elk or deer winter range, or buffer zones for other species. Maximum acres affected in this cover type would be 336 leaving 37,834 acres with no effect (including Wilderness). This loss of Great Basin sub-alpine habitat, 1 percent of the total acres, would be minimal.

Bristlecone Pine

A large portion of bristlecone pine stands are within the Wildernesses and protected by their withdrawal from leasing. Outside of Wilderness, there will be NSO in bristlecone pine stands. Because the vegetation mapping used for this analysis makes no distinction for the bristlecone pine in the Great Basin Sub-alpine vegetation community, the actual locations of bristlecone forests need to be field verified at the exploration project stage.

1.5.5. Cumulative Effects

Cumulative effects to the vegetative communities may result from the combination of past, present, and future livestock grazing; wild horse management; recreation uses such as hunting, off-highway vehicle use, dispersed camping; fuel wood harvest; road maintenance and construction; mineral exploration; and the proposed oil and gas exploration and development. There are other activities that may occur on the Project Area that are not addressed above, but these describe the major activities that are most likely to continue to occur regularly in the future. The cumulative impacts on the vegetation communities from these activities coupled with oil and gas exploration activities involves estimation of the extent of ongoing and proposed activities in relation to potential oil and gas exploration activity in the future. Some of the vegetation communities, such as the bristlecone pine and Great Basin Sub-apline, are located in areas not likely to be leased for oil and gas exploration. Large-scale oil and gas exploration in addition to past, present, and future activities could result in negative impacts to vegetation communities. Under Alternatives 1 and 2, minimal impacts are anticipated to any of the vegetation communities. Under Alternative 3 and 4 some loss or disturbance to these vegetation communities could occur if they are present within the lease area. If the areas affected by oil and gas exploration and production are small, large-scale cumulative affects are very unlikely. Vegetation communities are likely to be adequately protected by their proposed stipulations. The exceptions to this determination would be if large areas are leased for oil and gas exploration, and oil and gas reserves are found. This would increase the amount of area impacted and could result in negatives impacts to vegetation communities, especially aspen.

2. NOXIOUS WEEDS

2.1. Alternative 1 No Action/No Lease – Impacts to Natural Resources from Noxious Weeds

The affects to natural resources through potential increases in noxious weed populations would likely remain at existing levels or slightly decrease. No increases in existing levels of surface area disturbance from oil and gas exploration are expected, the likelihood that negative effects to natural resources from the establishment and spread of noxious weeds would not occur. Cumulative effects on native plant community are not likely. Risk Assessment ratings for the no-action alternative is low.

2.2. Alternatives 1, 2, 3 – Impacts to Natural Resources from Noxious Weeds Common to all Action Alternatives

The action alternatives affect natural resources through potential increases in noxious weed populations. Generally, the more surface area disturbance with oil and gas exploration, the more likely effects to natural resources from the establishment and spread of noxious weeds could occur.

For all of the action alternatives, there will be an estimated total of 396 acres of soil disturbance in the Project Area based on the reasonable foreseeable development (RFD) scenario. The risk assessment for

noxious weeds is similar for each of the action alternatives. Known populations of noxious weeds occur in the project area mainly along existing roads and creeks. There is a moderate risk that under any of the action alternatives possible adverse effects on site and possible expansion of infestation within project area could occur. Cumulative effects on native plant community are likely, but limited. Risk Assessment ratings for all of the action alternatives are medium and require that mitigation measures found in Forest Service Manual 2000 – National Forest Resource Management, Chapter 2080 – Noxious Weed Management, Supplement Number 2000-2004-1 be implemented.

3. GEOLOGY, GROUNDWATER, AND SOIL RESOURCES

3.1. Impacts to Geology and Soil Sensitive Resource Components

The action alternatives affect geologic and soil resources through potential increases in surface runoff, soil compaction, sheetwash erosion, gully formation, and slumping. Generally, the more surface area with oil and gas exploration and the steeper the slope in the disturbance area, the more likely effects to soil resources could occur.

For all of the action alternatives, there will be an estimated total of 396 acres of soil disturbance in the Project Area based on the reasonable foreseeable development (RFD) scenario. Each of the action alternatives would result in a differing amount of disturbance from oil and gas exploration in High and Very-High soil erosion hazard zones (greater than 25 percent slopes). The worst case scenario would be if all operations occurred in Very-High soil erosion hazard zones in the steep mountains. However, exploration is more likely to occur in the areas of moderate oil and gas potential that includes a mix of all of the soil erosion hazard zones.

Most of the soil disturbance would result from road construction, reconstruction, and restoration that would cross varied terrain conditions. BMPs can reduce soil disturbance effects to the areas surrounding the project operations. BMPs can reduce off-site effects more in the Low and Moderate soil erosion hazard zones and with greater difficulty and less effectiveness in the High and Very-High soil erosion hazard zones.

Seismic line surveys are not included in the oil and gas leasing process; rather these surveys would be considered in a separate environmental and permitting process. However, seismic line surveys would have direct soil erosion effects from oil and gas leasing and are, therefore, included in the reasonable foreseeable development (RFD) scenario.

Project Area lands were given stipulations of No Lease (NL), No Surface Occupancy (NSO), Controlled Surface Use (CSU), and Standard Lease Terms (SLT) based on the need for leasing constraints to protect sensitive soil resources. For oil and gas operations, soil resources receive the maximum protection from erosion effects with No Lease and NSO, moderate protection with Controlled Surface Use, and the least protection with Standard Lease Terms. The amount of soil erosion protection from these stipulations are added to the protection given by other resource stipulations and displayed in Table 4-1. This table does not include acres not available for leasing in the project area (wilderness and private land) since all alternatives exclude these acres from any leasing and will not be disturbed by oil and gas activities.

Table 4-1: Lease Stipulation Acres for all Resources in High to Very High Soil Erosion Hazard Zone Ratings Areas

Leasing Stipulation per Alternative	White Pine Division Area (acres)	Grant-Quinn Division Area (acres)	Total Stipulation Acres Available to Leasing	Percent of Total Project Area Available to Lease
	High to Very High Soil Erosion Hazard Zones (>25% slopes)	High to Very High Soil Erosion Hazard Zones (>25% slopes)		
Alternative 2				
NL	39,959	17,016	56,975	13%
NSO	77,505	43,819	121,324	27%
CSU	0	0	0	0
SLT	0	0	0	0
Alternative 3				
NL	29,845	21,865	51,710	11%
NSO	48,703	36,881	85,584	19%
CSU	51,745	14,919	66,664	15%
SLT	0	0	0	0
Alternative 4				
NL	0	0	0	0
NSO	9,946	14,371	24,317	5%
CSU	107,519	59,294	166,813	37%
SLT	0	0	0	0

3.1.1. Alternative 1: No Action/No Lease

Under this alternative, no changes would be expected to occur to the geologic and soil resources compared to existing conditions. Soils would continue to erode as a result of grazing, vegetation conversion, fires, existing roads, off-road vehicle travel, mining activities, and natural conditions.

3.1.2. Alternative 2: Forest Plan with Maximum Protection**3.1.2.1. No Lease and No Surface Occupancy**

Implementation of Alternative 2 would result in 178,299 acres (40 percent) of the Project Area available to leasing being protected from disturbances related to oil and gas exploration and/or development in high to very-high soil erosion hazards. Areas with a Very-High soil erosion hazard (greater than 40 percent slope) and High soil erosion hazard (25 to 40 percent slope) are classified as No Lease and NSO and would be excluded from surface disturbing activities. Compared to the other action alternatives, Alternative 2 minimizes project effects that could result in soil resource degradation.

The NSO stipulation does not include roads, pipeline development, powerlines and geophysical surveys. These activities would be managed according to the Forest Plan and other Forest Service guidelines.

3.1.2.2. Standard Lease Terms

Alternative 2 has land available for leasing with Standard Lease Terms for areas with moderate and low erosion hazards (25 percent slopes or less) and includes 270,833 acres (60 percent) of the planning area. This requires a surface use plan of operations for ground disturbing activities. This plan of operations contains a description of road and drill pad location, construction methods for containment and disposal of waste material, reclamation measures for disturbed areas no longer needed for operations, and other pertinent data as may be required by the surface managing agency. During environmental review for the surface use plan of operations, mitigation requirements are developed for the protection of the geologic and soil resources of the area. For example, an operator could be required to relocate proposed facilities up to 200 meters (656 feet) away or to delay operations for up to 60 days to avoid construction during wet periods, which may reduce or avoid soil erosion or slumps.

3.1.2.3. Access Roads

New and upgraded existing roads would cross a variety of sloped terrain for access to exploration well sites and other support facilities. The amount of erosion that would occur from access roads depends on the slope, surface materials, drainage controls, and amount of traffic. Surface and rill erosion, gully formation, and dust from wind and vehicle traffic are common effects from road construction and use in the Project Area. Unimproved roads constructed with native materials and little drainage controls have the greatest erosion and dust effects. Improved roads have gravel surfaces and more drainage controls that reduce erosion and dust formation. For all of the action alternatives, it is assumed that about 30 acres per year would be disturbed for upgrades of existing roads and new road construction and about 2 acres per year for supporting quarry sites. About 5 miles per year of improved roads and 3 miles per year of unimproved roads are expected to be constructed. Total road and quarry disturbance area would be about 320 acres for the 1.5 to 35-year life of the exploration and development periods.

Alternative 2 minimizes impacts from soil erosion and dust due to new road construction and use compared to the other action alternatives. With Alternative 2, most access roads would be located on the lower elevation slopes of the Project Area with less risk of erosion. Alternative 2 eliminates well sites from Very-High and High soil erosion hazard zones. Consequently, when compared to Alternatives 3 and 4, Alternative 2 would have potentially fewer roads built or used in these hazard zones. However, access roads could cross the smaller areas of Very-High and High soil erosion hazard zones in the hill and piedmont slope areas to access well sites.

3.1.2.4. Well Sites

Exploration well sites are constructed by grading a level area about 2 acres in size. For all of the action alternatives, it is assumed that two wells would be drilled per year or about 4 acres of land would be disturbed per year. The total disturbed area would be about 40 acres. To level an area in sloping terrain, cut slopes are needed on the uphill side and fill is needed on the downhill side. In steep terrain, the cut and fill slopes are higher and steeper and are vulnerable to slumping and erosion. Protection methods include riprap, crib structures, vegetation, erosion control blankets, or other slope protection. Because the well area consists of heavily traveled and compact surface materials, muddy and oily runoff may occur during rainstorms. In steeper terrain, it is more difficult to disperse the runoff from the site without causing gully erosion in the surrounding area.

Alternative 2 provides the greatest amount of protection from soil erosion and runoff effects of well sites compared to the other action alternatives. Alternative 2 eliminates well sites from Very-High and High soil hazard areas over 25 percent slope. Well sites would be limited to moderate and low soil hazard areas with reduced risk of erosion and slumping effects.

3.1.3. Alternative 3: Forest Plan with Moderate Protection

3.1.3.1. No Lease and No Surface Occupancy

Alternative 3 would have less area being protected from disturbances related to oil and gas exploration and/or development under the No Lease and NSO stipulation on soil erosion hazard compared to Alternative 2. Areas of Very-High soil erosion hazard (over 40 percent slope) are classified no surface occupancy. This includes 85,584 acres (19 percent) of the total Project Area available for leasing. Most of the NSO areas are located in the mountains, while a minimal amount is located in isolated areas in the hills and piedmont slope portions of the Project Area. As in Alternative 2, roads and pipelines could cross the smaller isolated steep areas in the hills and piedmont slope where Controlled Surface Use and Standard Lease Terms would regulate soil erosion control measures.

3.1.3.2. Controlled Surface Use

Areas of High soil erosion hazard (25 to 40 percent slope) are classified as Controlled Surface Use in Alternative 3 allowing a more rigorous control level for construction and restoration practices than would occur with Standard Lease Terms. Alternative 3 has 66,664 acres (15 percent) of the area available for leasing with Controlled Surface Use stipulations for soil erosion hazard, which is more than all the other alternatives. Most of this area is located on the lower hills and upper piedmont slopes surrounding the mountainous regions.

3.1.3.3. Standard Lease Terms

Alternative 3 has the same amount of land area with Standard Lease Terms due to erosion hazards as Alternatives 2 and 4 and includes 270,833 acres (60 percent) of the Project Area available for leasing. Areas with moderate and low erosion hazards (25 percent slope or less) are stipulated as Standard Lease Terms. This requires a surface use plan of operations for ground-disturbing activities. This plan contains a description of road and drill pad location, construction methods for containment and disposal of waste material, reclamation measures for disturbed areas no longer needed for operations, and other pertinent data as may be required by the surface managing agency. During environmental review for the surface use plan of operations, lease stipulations are developed that protect the geologic and soil resource values of the area. For example, an operator could be required to relocate proposed facilities up to 200 meters (656 feet) away or delay operations for up to 60 days to avoid construction during wet periods, which may reduce or avoid soil erosion or slumps.

3.1.3.4. Access Roads

Alternative 3 provides less protection from soil erosion and dust effects from access roads compared to Alternative 2. Access roads on High soil erosion hazard zones would be constructed using Controlled Surface Use stipulations resulting in decreased protection for soil erosion as compared to Alternative 2. Alternative 3 would not allow well sites on Very-High soil erosion hazard zones. Similar to Alternative 2, there would be no incentive to build access roads into the steeper mountainous areas. However, access roads could cross the smaller areas of Very-High soil erosion hazard in the hills and piedmont slopes. Access roads on slopes with Moderate and Low soil erosion hazard would be managed under Standard Lease Terms in the same manner as Alternative 2.

3.1.3.5. Well Sites

Alternative 3 provides less protection from soil erosion and runoff effects at well sites compared to Alternative 2. Well sites would not be constructed in Very-High soil erosion hazard zones over 40

percent slope, which is the same as Alternative 2. However, well sites could be constructed in areas of High soil erosion hazard. Standard Lease Terms would apply for well sites in moderate and low soils erosion hazard zones.

3.1.4. Alternative 4: Forest Plan

3.1.4.1. No Lease and No Surface Occupancy

Implementation of Alternative 4 would result in more area available for oil and gas leasing compared to the other action alternatives. There are no acres associated with the No Lease stipulation. None of the area classified as NSO is due to the soil hazard rating. Roads and pipelines could cross the High and Very-High soil erosion hazard zones where a Controlled Surface Use stipulation would regulate soil erosion measures. Other resources, however, have NSO stipulations that protect these High and Very-High soil erosion hazard zones. There are 24,317 acres (5 percent) protected under NSO. Alternative 4 has the greatest area of High and Very-High soil erosion hazard area available for leasing and therefore has the greatest potential for soil erosion and slope failure effects.

3.1.4.2. Controlled Surface Use

Controlled Surface Use stipulations apply on the High and Very-High erosion hazard zones (greater than 25 percent slopes). This encompasses 166,813 acres (37 percent) of the total Project Area available to leasing, most of which is in the higher elevation mountainous regions. CSU stipulations could include restrictions such as road densities, road location, and special construction methods that would reduce the overall effects of the disturbance.

3.1.4.3. Standard Lease Terms

Alternative 4 has the same amount of land area available to leasing with Standard Lease Terms due to erosion hazards as Alternatives 2 and 3 and includes 270,833 acres (60 percent) of the planning area. Areas with moderate and low erosion hazards (25 percent slope or less) are stipulated as Standard Lease Terms. This requires a surface use plan of operations for ground disturbing activities. This plan contains a description of road and drill pad location, construction methods for containment and disposal of waste material, reclamation measures for disturbed areas no longer needed for operations, and other pertinent data as may be required by the surface managing agency. During environmental review for the surface use plan of operations, lease stipulations are developed that protect the geologic and soil resource values of the area. For example, an operator could be required to relocate proposed facilities up to 200 meters (656 feet) away or delay operations for up to 60 days to avoid construction during wet periods, which may reduce or avoid soil erosion or slumps.

3.1.4.4. Access Roads

Alternative 4 would allow for access roads in more areas of the Forest than Alternatives 2 and 3. Portions of the Project Area with slopes over 40 percent would receive site-specific requirements during approval of the surface use plan of operations. With Alternative 4, well sites could be constructed in the Very-High and High soil erosion hazard zones. Access roads may cross difficult terrain to these sites. Slumps, sheetwash erosion, and rill erosion from these access roads could occur due to steep cut-and-fill slopes, the greater difficulty of dispersing storm runoff concentrated by the roads, site restoration constraints, and higher rainfall in mountainous areas. Soil erosion from access roads in the Moderate and Low soil erosion hazard zones would be similar to Alternatives 2 and 3.

3.1.4.5. Well Sites

Alternative 4 would allow for well sites in more areas than Alternatives 2 and 3. In the Very-High and High soil erosion hazard zones, well site construction could result in additional soil slumping and increased surface erosion dependent on site-specific conditions. Alternative 4 would likely result in more soil erosion effects than may occur with Alternatives 2 and 3. Soil erosion from well sites in the Moderate and Low soil erosion hazard zones would be similar to Alternatives 2 and 3.

Alternative 4 offers the least protection of all action alternatives with controlled surface occupancy stipulated for the high and very high soil erosion hazards and Standard Lease Terms being applied to the rest of the area. The protection offered with Alternative 3 is intermediate between Alternatives 2 and 4.

3.1.5. Indirect Effects

The indirect effects of oil and gas leasing in the proposed Project Area are those that may result from the direct effects mentioned above. These direct effects could lead to increased sediment in streams, alteration of stream channels, streambank erosion, degradation of water quality and aquatic habitat (including fish habitat), loss of riparian meadows and wetlands, vegetation conversion, encroachment of invasive plant species, loss of wildlife habitat and quality grazing areas for domestic livestock, and loss of recreational opportunities through road and trail degradation. As with the direct effects, Alternative 2 offers the most protection and Alternative 4 the least, with Alternative 3 being intermediate.

3.1.6. Cumulative Effects

Other past, present, and future activities and site conditions within the Project Area lands that may affect slope stability and soil erosion include seismic activities, grazing, vegetation conversion, wildfires, vegetation management, recreational use, off-road vehicle travel, and mining operations with associated use of access roads. When considering cumulative effects, all past, present, and possible future activities or natural events must be considered. Areas of oil and gas exploration and development that occur in close proximity to past, present, or future sites in which other activities or natural events have caused degradation are most susceptible to adverse cumulative effects.

3.1.7. Unavoidable Effects

Within the Very-High and High soil erosion hazard zones, if development were to occur, restoration may not be fully successful in areas vulnerable to mass wasting. This effect would only be significant at the local scale, not in the context of the entire Project Area. Site-specific analysis will occur before development, and would usually preclude use in these areas.

3.2. Impacts to Groundwater Sensitive Resource Components

3.2.1. Alternative 1: No Action/No Lease

Groundwater flow conditions in the Project Area would not be expected to change (under Alternative 1) over the same 1.5 to 35-year period specified for the leasing alternatives (Alternatives 2, 3, and 4). Groundwater will continue to flow from mountain recharge areas into the carbonate-rock and basin-fill aquifers to discharge as spring flow in the valleys, evaporate from the valley floors, or follow deep flow paths into adjacent valleys.

3.2.2. Alternative 2: *Forest Plan with Maximum Protection*

3.2.2.1. Direct and Indirect Effects

The reasonable foreseeable development scenario described in Chapter 1 estimates approximately 360 acres of disturbance associated with the Proposed Action. It is highly unlikely that all of this disturbance would be contiguous. BMPs and mitigation measures would also prevent concentration of the disturbance in one area.

Groundwater sensitive resource components described in Chapter 3 were not identified as stipulations in the development of project alternatives, as reflected in the alternative development table (Table 2-4) in Chapter 2. Potential impacts to groundwater of Alternatives 2, 3, and 4 were therefore evaluated without stipulations. The potential impacts of Alternative 2 on groundwater sensitive resource components can be grouped by groundwater quality and groundwater quantity.

Potential Groundwater Quality Effects

A variety of existing regulations and policies of state and Federal agencies are applied to oil and gas exploration operations, as summarized in Table 4-2. These restrictions address proper management of hazardous materials and hazardous substances; and construction, operation, and abandonment of exploratory wells. The regulations and policies are implemented by specific permit provisions, inspections, and penalties; and mandated corrective measures.

Although these existing regulations and policies provide an extensive framework for groundwater quality protection, accidents and violations are possible. Groundwater can become contaminated from improper handling of hazardous materials associated with the oil and gas exploration process (such as fuels, drilling chemicals, and oil and saltwater produced during drilling and testing). These types of spills and leaks occur on the ground surface or in tanks and piping, and can migrate downward through the soil to groundwater. Deep, freshwater aquifers can also be contaminated by oil or saltwater leakage from production zones, or by interconnection of freshwater aquifers of different chemical quality, as a result of improper drilling and well construction practices during oil and gas exploration. Once groundwater has been contaminated it can flow to wells and springs and render the groundwater unfit for beneficial uses.

In the event of an accident or violation, inspections by regulatory agencies or reporting by lease permittees would likely result in early identification of groundwater quality problems and implementation of corrective measures. Groundwater contamination occurrences that were formerly common to oil and gas exploration operations are now prevented or quickly mitigated, due to the higher level of regulatory oversight and enforcement. For example, shallow groundwater contamination from unlined saltwater disposal pits that occurred in the Eagle Springs oil field in the early 1970s (Van Denburgh and Rush 1973; see Chapter 3) would not likely occur in a new oil exploration operation, due to the regulatory prohibition of unlined brine collecting pits (see Table 4-2).

Potential Groundwater Quantity Effects

Water wells are commonly installed at oil and gas exploration sites to provide water supply during the drilling operation (for mixing drilling mud, cleaning equipment, cooling engines, etc.). Water supply requirements at oil exploration sites are estimated at 5,000 to 15,000 gallons of water per day, which is equivalent to 3.5 to 10.4 gallons per minute of continuous pumping. This is a small rate of withdrawal, and would not be expected to produce interference drawdown impacts in nearby wells and springs. As indicated in Chapter 3, the State of Nevada allows waivers of groundwater withdrawal permits for oil,

gas, or geothermal exploration projects. Nevada water law will be adhered to in order to protect other water right users. Laws protect senior water rights holders.

3.2.2.2. Cumulative Effects

Groundwater use in and adjacent to the Project Area could increase over the 1.5 to 35-year period if economic growth occurs, resulting in an increased demand for groundwater supply (including domestic drinking water, irrigation, stock watering, mining, and waterfowl management). If such increases in groundwater withdrawal are concentrated in local areas, declines in groundwater levels could occur. Growth and expansion of commercial and industrial activities could also result in increase storage use of hazardous materials and generation of hazardous waste. The boundaries for any cumulative affects are the boundaries of the Project Area, which are the same as the hydrographic area boundaries for all basins within the project area (see Map 3-17).

The aquifers that may be affected do not extend into Utah. Ground water pumping associated with drilling and production is not likely to affect any areas in Utah. The closest ground-water basin in Utah is Spring Valley (partially located in Nevada), three basins to the east of White River Valley and Jakes Valley. The eastern border of the White Pine Unit lies on the west side of these two basins, about 65 miles from the Utah border, so the minimal amount of water that may be pumped as a result of oil and gas exploration and production, would have no effect on water in the Snake Valley Basin.

The Eagle Springs Oil Field, outside of Curant, Nevada, first came into production in 1954 (see Appendix C). Although it may not have been in continuous production since that time, a number of flowing wells at the nearby wildlife refuge have continued to produce enough water to supply the refuge. More information can be obtained at the BLM office in Tonopah, Nevada.

There will likely be no cumulative effects from pumping in the Project Area when combined with pumping that may occur in Lincoln and White Pine Counties as a result of Southern Nevada Water Authority's proposed pipeline and ground-water pumping project. None of the basins that Southern Nevada Water Authority has proposed pumping water from are in the Project Area. The Tikaboo Valley North Hydrographic Basin, where Southern Nevada proposes to pump 11,580 acre-feet per year borders the Sand Spring Valley Basin (in the Project Area). The Cave Valley Basin, where Southern Nevada also proposes to pump 11,580 acre-feet per year, is adjacent to the White River Valley Basin. These are the only areas where basins affected by the two projects are adjacent to each other; the map shows a considerable distance between areas of the two projects where pumping is proposed.

The proposed coal-fired power plant near Ely could possibly use 25,000 acre-feet per year. The plant would be located in Steptoe Valley, which is directly adjacent to White River Valley and Jakes Valley. Again, there would likely be no cumulative effects due to the distance between the two proposed projects (about 40 miles minimum).

If oil and gas development occurred in both the Grant-Quinn and White Pine units, it is reasonable to assume that a total of 626 acre-feet of ground-water would be pumped over the entire Project Area during the life of the project. It is also reasonable to assume that water used from other sources (reservoirs, rivers, lakes) would be twice that amount, or 1,252 acre-feet. This would total 1,878 acre-feet of water used for both exploration and production over the life of the project for the entire Project Area.

Existing regulatory requirements should prevent spills and leaks of hazardous materials that would otherwise cause impacts to groundwater quality. The regulatory framework described above regarding the Proposed Action (leasing for oil and gas exploration) also applies to the connected and cumulative actions of oil and gas production. The prevention, inspection, and corrective action components of these

regulations would minimize the risk of groundwater contamination and groundwater level declines. As with the oil and gas exploration process, however, accidents and violations are possible. Potential groundwater quality and groundwater quantity impacts from connected and cumulative actions associated with Alternative 2 are described as follows:

Potential Groundwater Quality Effects

Potential groundwater quality effects include:

- Contamination of groundwater from improper handling of hazardous materials associated with the oil and gas production (such as fuels for well pumps, produced oil in piping systems and storage tanks, residuals from the oil/water separation process, and saltwater generated during the production process).
- Contamination of groundwater from improper production well construction, rehabilitation, or operation (such as oil and saltwater released by wellhead blowouts, and leakage between oil production zones and freshwater aquifers at depth).
- Migration of groundwater contamination to wells or springs that provide groundwater for beneficial uses.

Potential Groundwater Quantity Effects

Potential groundwater quantity effects include:

- Reduced pressure or water levels in oil production zones that extend beneath multiple lease areas (including Railroad Valley Oil Field), as a result of oil, gas, and saltwater withdrawal at oil and gas production sites.
- Drawdown in the groundwater levels from multiple wells in and surrounding the Project Area such as agricultural irrigation wells.
- Reduction or elimination of flows in springs and seeps.

3.2.3. Alternative 3 and 4: *Forest Plan with Moderate Protection and Forest Plan*

3.2.3.1. Direct and Indirect Effects

Alternatives 3 and 4 generally provide fewer operational restrictions for oil and gas exploration leasing in the Project Area, and could therefore be expected to produce potential impacts greater than anticipated for Alternative 2 (the action alternative with the most restrictive leasing stipulations). However, because no groundwater stipulations were identified for the three action alternatives (Alternatives 2, 3, and 4), the operational restrictions are the same for all three alternatives. Therefore, the potential impacts to groundwater of Alternatives 3 and 4 would be the same as described for Alternative 2.

3.2.3.2. Cumulative Effects

The connected and cumulative actions of Alternatives 3 and 4 would be the same as for Alternative 2, with respect to activities that could potentially impact groundwater. Therefore, the potential impacts of

connected and cumulative actions associated with Alternatives 3 and 4 would be the same as described for Alternative 2.

3.2.4. Mitigation Measures

3.2.4.1. Groundwater

Potential impacts to groundwater quantity and quality from the project action Alternatives 2, 3, and 4 would be mitigated through compliance with and implementation of existing regulations and policies that apply to the leasing of Federal lands in Nevada for oil and gas exploration. Specific regulations and policies that provide mitigation are summarized in Table 4-2, and are common to all three alternatives. If these regulations and policies are properly implemented, no additional mitigation of potential groundwater impacts would be required, as noted in Table 4-2.

Table 4-2: Summary of Possible Groundwater Mitigation for Alternatives 2, 3, and 4.

	Potential Mitigation			Additional Mitigation Needed
Potential Impact	Mitigation Provided by Existing Regulations and Policies			
	Agency	Regulation	Mitigated Issue	
Groundwater contamination from improper handling of hazardous materials	USDI-Bureau of Land Management	Standard Practices and Procedures for Geophysical Operations and Conditions of Approval	Hazardous materials used or generated during drilling and production operations must be contained	None
			Portable mud pits are recommended to protect natural resources	
		Chapter 43, Code of Federal Regulations, Group 3100	Produced water must be disposed of by methods approved by the authorization officer	
	Nevada Division of Minerals	Chapter 522, Nevada Administrative Code	Unlined brine collecting pits are prohibited	
Contamination of freshwater aquifers at depth from improper drilling, well construction, and production procedures	USDI-Bureau of Land Management	Chapter 43, Code of Federal Regulations, Group 3100	Specific well construction features and procedures are required	None
			BLM inspectors observe critical events during well drilling and casing installation	
	Nevada Division of Environmental Protection	Chapter 445, Nevada Administrative Code	Permits are required for subsurface injection of brine (Class II injection wells)	
Contamination of freshwater aquifers at depth from improper drilling, well construction, and production procedures (continued)	Nevada Division of Minerals	Chapter 522, Nevada Administrative Code	Specific well construction features and procedures are required	None
			State inspectors observe critical events during well drilling and casing installation	

4. WILDERNESS, INVENTORIED ROADLESS AREAS, RECREATIONAL SETTING, AND SCENIC RESOURCES

4.1. Impacts to Wilderness Sensitive Resource components

4.1.1. Alternative 1: No Action/No Lease

This alternative will not affect the three Wildernesses in the Project Area. No exploration would occur anywhere on the two divisions.

4.1.2. Alternative 2: *Forest Plan* with Maximum Protection

Under this alternative the Wilderness would not be offered for lease and no drilling would occur within the Wilderness.

Under this alternative all inventoried roadless areas will have a NSO stipulation within 800 meters (2,625 feet) of their boundaries and all road construction/reconstruction is prohibited. Areas more than 800 meters (2,625 feet) inside the boundary are withdrawn from consideration for leasing. There would be no direct disturbance of roadless characteristics.

The majority of the Wilderness boundaries are bordered by inventoried roadless areas. The restrictions on drilling in roadless areas would limit the amount of drilling that could potentially occur near the Wilderness boundaries. It is highly unlikely that any drilling outside of the Wilderness would impact the Wilderness character, though it is possible that disturbances related to drilling could be visible from high points within Wilderness areas. This might have a minimal adverse effect to primitive unconfined recreation and overall feeling of solitude. The apparent naturalness of the Wilderness areas would be negatively affected if a disturbance is visible, but the closest possible disturbance to any Wilderness area under this alternative is greater than 800 meters, making any negative effects to apparent naturalness or any other wilderness characteristics highly unlikely.

4.1.3. Alternative 3: *Forest Plan* with Moderate Protection

Under this alternative the Wilderness would not be offered for lease and no drilling would occur within the Wilderness.

Under this alternative the majority of lands that surround the Wilderness would be available for leasing. The south boundary of the Quinn Canyon Wilderness would be protected by an NSO stipulation in the selected Quinn Canyon inventoried roadless area. It is possible that drilling adjacent to the Wilderness in other areas could affect the wilderness character of the Wilderness. Assumptions for this analysis are that no more than four exploration wells would be drilled and one production area developed in the vicinity of Wilderness boundaries.

Sights and sounds associated with exploration and production activities could degrade the primitive characteristics of Wilderness lands within the immediate vicinity of the activities. Apparent naturalness, remoteness, solitude and opportunities for primitive recreation could all be adversely affected under this alternative, though the true natural integrity of Wilderness areas would likely remain intact.

Any disturbances related to drilling would be localized and short term. Production activities and disturbance would likely be long term, but would be less intrusive than drilling operations due to fewer

and smaller structures, reduced vehicle traffic, less noise and light intrusion, and reduced size of well head area. Interim and final reclamation would restore the disturbance to natural conditions that blend in with existing terrain. Short-term adverse effects to Wilderness characteristics are possible under this alternative, but long-term effects would likely be minimal, with Wilderness areas retaining natural integrity and other Wilderness attributes. There is little likelihood of altering the Wilderness character and manageability of these Wilderness areas.

4.1.4. Alternative 4: Forest Plan

Under this alternative the Wilderness would not be offered for lease and no drilling would occur within the Wilderness.

Under this alternative all of the lands that surround the Wilderness would be available for leasing. It is possible that drilling adjacent to the Wilderness could affect the Wilderness character of the Wilderness. Assumptions for this analysis are that no more than four exploration wells would be drilled and one production area developed in the vicinity of Wilderness boundaries.

Sights and sounds associated with exploration and production activities could degrade the primitive characteristics of Wilderness lands within the immediate vicinity of the activities. All Wilderness attributes including natural integrity, apparent naturalness, remoteness, solitude and opportunities for primitive recreation would likely be adversely affected in any area near a drill site or production area. In addition to visual and audio impacts, disturbance adjacent to Wilderness boundaries would likely affect natural resources within Wilderness areas. There could be impacts to soil, water, and air resources as well as diversity of plant and animal communities that might adversely affect the natural integrity of Wilderness areas.

Any disturbances related to drilling would be localized and short term. Production activities and disturbance would likely be long term but would be less intrusive than drilling operations due to fewer and smaller structures, reduced vehicle traffic, less noise and light intrusion, and reduced size of well head area. Interim and final reclamation would restore the disturbance to natural conditions that blend in with existing terrain. Short-term adverse effects to wilderness characteristics are likely under this alternative, but long-term effects would likely be minimal, with wilderness areas retaining overall natural integrity and other wilderness attributes. There is little likelihood of altering the wilderness character and manageability of these Wilderness areas. Boundary areas directly adjacent to drilling or production areas could be adversely affected for a longer term, making careful and thorough reclamation and restoration imperative in these areas.

4.1.5. Cumulative Impacts

Cumulative impacts were assessed over the entire acreage of the three designated Wildernesses. Past human-related activities in the three Wildernesses have been very minimal and present recreational use is light. Reasonably foreseeable actions within the Wilderness include continued recreational use and the potential for wildland fire use and suppression. Overall, the natural integrity and natural appearance of the Wilderness is very high with very little development. All three areas provide a high degree of remoteness and solitude, which is not expected to change in the near future.

4.2. Impacts to Inventoried Roadless Areas Sensitive Resource Components

Under all of the action alternatives (Alternatives 2 through 4), the stipulations would apply only to on-lease activities such as the placement of drill and well sites and production facilities such as tank batteries and compressor stations. *Forest Plan* standards and guidelines would govern the design, placement, and decisions related to any proposed roads or other linear facilities (pipeline and powerlines) that typically extend beyond the lease boundaries. This allows for consistent standards to be applied, whether located on or off lease.

4.2.1. Alternative 1: No Action/No Lease

This alternative would not affect the character of the inventoried roadless areas or the wilderness attributes of the inventoried roadless areas because no leasing would take place within the Project Area.

4.2.2. Alternative 2: *Forest Plan* with Maximum Protection

Under this alternative all inventoried roadless areas will have a NSO stipulation within 800 meters (2,625 feet) of their boundaries. Interior areas more than 800 meters (2,625 feet) inside the boundary have the No Lease stipulation. The NSO and NL stipulations would prohibit disturbance associated with wells, tanks, and exploration drilling from occurring within the inventoried roadless areas. Off-lease disturbance such as roads, pipelines and power lines could occur within roadless areas and may negatively impact the roadless character.

4.2.2.1. Roadless Area Characteristics

1) High quality or undisturbed soil, water, and air

Impacts to soil and water would be minimal under this alternative because no drilling would be allowed within IRAs. Some off-lease disturbances might be allowed in IRAs and could have minimal negative impacts to soil or water resources through erosion and ground disturbing activities. Air resources could be negatively impacted by increased particulate matter and dust from ground disturbing activities.

2) Sources of public drinking water

There are no municipal watersheds or public drinking water facilities in or near the project area.

3) Diversity of plant and animal communities

This is analyzed under the wildlife section of this document.

4) Primitive, semi-primitive non-motorized and semi-primitive motorized classes of dispersed recreation

This alternative allows for roads and other off-lease disturbances within IRAs which could negatively impact primitive and semi-primitive non-motorized recreation. These developments would be visible to the recreating public, diminishing the quality of primitive and non-motorized recreation experiences. Motorized recreation access could be improved by road construction, but the semi-primitive quality could be lost if these off-lease disturbances are widespread or intrusive.

5) Habitat for threatened, endangered, proposed, candidate and sensitive species and for those species dependent on large undisturbed areas of land

This is analyzed under the wildlife section of this document.

6) Reference landscapes

Reference landscapes are largely undisturbed landscapes retaining natural character and with naturally functioning ecosystems. These areas can be used as comparison areas that may be useful to study the effects to more intensively managed areas. Disturbances and structures such as roads, pipelines, and powerlines could alter these characteristics, making the area no longer viable as a reference landscape. Due to the limited amount of disturbance of the Reasonably Foreseeable Development Scenario and that most disturbance would occur outside of any given IRA, most of the IRAs in the project area would not be impacted and would therefore still serve as reference areas.

7) Natural appearing landscapes with high scenic quality

Under this alternative the potential for disturbance and off-lease structures could change the natural appearance of these landscapes, degrading the scenic quality. Due to the limited amount of disturbance of the Reasonably Foreseeable Development Scenario and that most disturbances would occur outside of any given IRA, most of the IRAs in the project area would not be impacted. Therefore, there would be no impact to the landscapes and the scenic quality of the areas would be unimpaired.

8) Traditional cultural properties and sacred sites

This is analyzed in the cultural section of this document.

9) Other locally identified unique characteristics

There are few unique or outstanding individual features in the project area, but the remoteness and wild quality of many of these roadless areas is unique. This quality could be altered by off-lease disturbances. There are impressive rock formations, a variety of natural vegetation types, and remote high grasslands. A small number new roads or structures would have little effect to these features.

4.2.2.2. Wilderness Attributes

1) Natural integrity

There is some evidence of historical mining in some of the roadless areas, but many are still intact with very few visible disturbances. Cattle grazing, both present and historical has left an impact on most of these roadless areas, so the natural integrity has been compromised. Structures associated with grazing and other uses are rare and dispersed, leaving most of the roadless areas with Medium to High natural integrity. Currently, recreation is generally occurring mostly near roads with very little affect to the natural integrity of roadless areas. Any structures or disturbances associated with off-lease activity would diminish this characteristic.

2) Apparent naturalness

Apparent naturalness has been slightly reduced by the same issues affecting natural integrity. Development of roads and structures could negatively alter this characteristic.

3) Remoteness

These roadless areas are all remote, with some ranching and mining developments occasionally visible, but not widespread. A small number of off-lease developments would not significantly alter this characteristic, but visible roads, pipelines, powerlines or other linear features would certainly detract from this characteristic.

4) Solitude

Roadless areas are generally undeveloped and seldom visited in this region. One can find a feeling of solitude in any of these roadless areas; the wild and remote feeling of Eastern Nevada is very rare. A small number of developments would have minimal impact to this characteristic, but larger scale disturbances and linear features would certainly detract from the solitude of the area.

5) Opportunities for primitive recreation

This alternative allows for roads and other off-lease disturbances which could negatively impact primitive recreation. These developments would be visible to the recreating public, diminishing the quality of a primitive experience. A primitive recreation experience is one where the visitor sees little evidence of the works of humans. Currently there are many places in the concerned roadless areas with this experience could be found. Also there are areas where mining, grazing, motorized recreation and other evidence of humans exist, but these are dispersed. Any developments would negatively impact these opportunities.

6) Special feature (ecological, geologic, scenic, or historical)

There are few unique or outstanding individual features in the Project Area, but the remoteness and wild quality of many of these roadless areas is unique. This quality could be altered by off-lease disturbances. There are impressive rock formations, a variety of natural vegetation types, and remote high grasslands. A small number new roads or structures would have little effect to these features.

7) Manageability (as Wilderness)

Any feature constructed on a roadless area will certainly diminish manageability as a Wilderness area, particularly a road that would provide potential incursion points. Looked at as a whole, if the of structures and miles of new roads are kept to a minimum, small segments of roadless areas may be less manageable as Wilderness, but large areas would be intact.

4.2.3. Alternative 3: Forest Plan with Moderate Protection

Under this alternative, three inventoried roadless areas are afforded protection from oil and gas development. These areas are the White Pine Mountains, Quinn, and Shellback inventoried roadless areas. They were selected for their primitive and semi-primitive characteristics, proximity to existing Wilderness, size (greater than 5,000 acres), and manageability. These roadless areas will have a NSO stipulation within 800 meters (2,625 feet) of their boundaries. Areas more than 800 meters from the boundary are withdrawn from consideration for leasing.

4.2.3.1. Roadless Area Characteristics

1) High quality or undisturbed soil, water, and air

Impacts to soil and water would be minimal under this alternative and drilling would not be allowed in three large IRAs. Some off-lease disturbances might be allowed in IRAs and could have minimal negative impacts to soil or water resources through erosion and ground disturbing activities. Air resources could be negatively impacted by increased particulate matter and dust from ground disturbing activities. There is potential for some localized adverse effects in IRAs that are not protected under this alternative, but due to the limited amount of disturbance of the Reasonably Foreseeable Development Scenario and that most disturbances would occur outside of any given IRA, most of the IRAs in the Project Area would not be impacted. Soil, water and air quality should remain undisturbed.

2) Sources of public drinking water

There are no municipal watersheds or public drinking water facilities in or near the project area.

3) Diversity of plant and animal communities

This is analyzed under the Wildlife section of this document.

4) Primitive, semi-primitive non-motorized and semi-primitive motorized classes of dispersed recreation

This alternative allows for roads and other off-lease disturbances within IRAs as well as drilling in all but three large IRAs, which could negatively impact primitive and semi-primitive non-motorized recreation in those affected areas. These developments would be visible to the recreating public, diminishing the quality of primitive and non-motorized recreation experiences. Motorized recreation access could be improved by road construction, but the semi-primitive quality could be lost if these disturbances are widespread or intrusive. Given the Reasonably Foreseeable Development Scenario and the likelihood that most disturbances would occur outside of any given IRA, negative impacts to primitive and semi-primitive recreation would probably be minimal, and there would be no negative impact to the protected IRAs under this alternative.

5) Habitat for threatened, endangered, proposed, candidate and sensitive species and for those species dependent on large undisturbed areas of land

This is analyzed under the Wildlife section of this document.

6) Reference landscapes

Reference landscapes are largely undisturbed landscapes retaining natural character and with naturally functioning ecosystems. These areas can be used as comparison areas that may be useful to study the effects to more intensively managed areas. Disturbances and structures such as roads, pipelines, powerlines, and drill pads could alter these characteristics, making the area no longer viable as a reference landscape. Due to the limited amount of disturbance of the Reasonably Foreseeable Development Scenario and the likelihood that most disturbances would also occur outside of any given IRA, most of the IRAs in the project area would still be capable of serving as reference areas. The three protected IRAs under this alternative would retain viability as reference landscapes.

7) Natural appearing landscapes with high scenic quality

Under this alternative the potential for disturbance and off-lease structures could change the natural appearance of these landscapes, degrading the scenic quality. Also the potential for drilling within the IRAs that are unprotected under this alternative could impact the natural appearance of these IRAs. However, due to the limited amount of disturbance of the Reasonably Foreseeable Development Scenario and the likelihood that most disturbances would occur outside of any given IRA, most of the IRAs in the project area would not be impacted. Therefore, there would be no impact to the landscapes and the scenic quality of the areas would be unimpaired.

8) Traditional cultural properties and sacred sites

This is analyzed in the Cultural section of this document.

9) Other locally identified unique characteristics

There are few unique or outstanding individual features in the project area, but the remoteness and wild quality of many of these roadless areas is unique. This quality could be altered by off-lease disturbances as well as drilling in the unprotected IRAs. There are impressive rock formations, a variety of natural vegetation types, and remote high grasslands. A small number new roads or structures would have little effect to these features.

4.2.3.2. **Wilderness Attributes**

1) Natural integrity

There is some evidence of historical mining in some of the roadless areas, but many are still intact with very few visible disturbances. Cattle grazing, both present and historical, has left an impact on most of these roadless areas, so the natural integrity has been compromised. Still, structures associated with grazing and other uses are rare and dispersed, leaving most of the roadless areas with medium to high natural integrity. Currently recreation is generally occurring mostly near roads with very little effect to the natural integrity of roadless areas. The three IRAs that are protected under this alternative have greater natural integrity which would be protected under the Reasonably Foreseeable Development Scenario. Any structures or disturbances associated with off-lease activity or drilling could diminish this characteristic in the unprotected IRAs, but given the Reasonably Foreseeable Development Scenario combined with the likelihood that most disturbance would also occur outside of any given IRA, there will likely be no real impact to natural integrity.

2) Apparent Naturalness

Apparent naturalness has been slightly reduced by the same issues affecting natural integrity. Development of roads and structures could negatively alter this characteristic. Any drill site and associated disturbances would certainly adversely affect apparent naturalness. Even given the Reasonably Foreseeable Development Scenario, there is a potential that the apparent naturalness of any of the unprotected roadless areas could be altered. The three protected IRAs would retain this quality under this alternative.

3) Remoteness

These roadless areas are all remote, with some ranching and mining developments occasionally visible, but not widespread. A small number of off-lease developments would not significantly alter this

characteristic, but roads, pipelines, powerlines or other linear features would certainly detract from this characteristic where visible. After analyzing the Reasonably Foreseeable Development Scenario, combined with the likelihood that most disturbances would also occur outside of any given IRA, no adverse impacts to remoteness are expected in either the protected and unprotected IRAs.

4) Solitude

Roadless areas are generally undeveloped and seldom visited in this region. One can find a feeling of solitude in any of these roadless areas. The wild and remote feeling of eastern Nevada is very rare. A small number of developments would have minimal impact to this characteristic, but larger scale disturbances and linear features would certainly take away from the solitude of the area. The feeling of solitude should not be impacted in the three protected IRAs because developments would not be experienced in most of the large area of these IRAs. After analyzing the Reasonably Foreseeable Development Scenario, combined with the likelihood that most disturbances would also occur outside of any given IRA, no adverse impacts to solitude are expected.

5) Opportunities for Primitive Recreation

This alternative allows for roads and other off-lease disturbances as well as potential developments with in some IRAs, which could negatively impact primitive recreation. These developments would be visible to the recreating public, diminishing the quality of a primitive experience. A primitive recreation experience is one where the visitor sees little evidence of the works of humans. Currently there are many places in the concerned roadless areas with this experience could be found. Also there are areas where mining, grazing, motorized recreation and other evidence of humans exist, but these are dispersed. Any developments would negatively impact these opportunities, but given the Reasonably Foreseeable Development Scenario, combined with the likelihood that most disturbances would also occur outside of any given IRA, abundant opportunities for primitive recreation would still exist in most of the IRAs, particularly in the three protected under this alternative.

6) Special Feature (Ecological, Geologic, Scenic, or Historical)

There are few unique or outstanding individual features in the project area, but the remoteness and wild quality of many of these roadless areas is unique. This quality could be altered by off-lease disturbances or associated impacts of leasing. There are impressive rock formations, a variety of natural vegetation types, and remote high grasslands. A small number new roads or structures would have little effect to these features.

7) Manageability (as Wilderness)

Any feature constructed on a roadless area will certainly diminish manageability as a Wilderness area, particularly a road that would provide potential incursion points. Viewed from a large scale, if the number of structures and miles of new roads are kept at a minimum, small segments of roadless areas may be less manageable as Wilderness; but large areas would be intact, and the three protected under this alternative should completely retain the potential to be managed as wilderness.

4.2.4. Alternative 4: Forest Plan

Under this alternative, all roadless areas are available for lease and covered by SLTs. The NSO stipulation for other resources such as Primitive Recreation Opportunity Spectrum, Retention Visual Quality Objective, Bristlecone Pine vegetation community would provide additional protection to roadless areas.

4.2.4.1. Roadless Area Characteristics

1) High quality or undisturbed soil, water, and air

Impacts to soil and water are possible under this alternative. Drilling would be potentially allowed in all IRAs. Some off-lease disturbances might be allowed in IRAs and could have minimal negative impacts to soil or water resources through erosion and ground disturbing activities. Air resources could be negatively impacted by increased particulate matter and dust from ground disturbing activities. There is potential for some localized adverse effects in IRAs, but due to the limited amount of disturbance of the Reasonably Foreseeable Development Scenario, combined with the likelihood that most disturbances would also occur outside of any given IRA, most of the IRAs in the project area would not be impacted. Soil, water, and air quality should remain undisturbed, but there could be localized adverse impacts.

2) Sources of public drinking water

There are no municipal watersheds or public drinking water facilities in or near the project area.

3) Diversity of plant and animal communities

This is analyzed under the Wildlife section of this document.

4) Primitive, semi-primitive non-motorized and semi-primitive motorized classes of dispersed recreation

This alternative allows for roads and other off-lease disturbances within IRAs as well as drilling in all IRAs, which could negatively impact primitive and semi-primitive non-motorized recreation in those affected areas. These developments would be visible to the recreating public, diminishing the quality of primitive and non-motorized recreation experiences. Motorized recreation access could be improved by road construction, but the semi primitive quality could be lost if these disturbances are widespread or intrusive. Given the Reasonably Foreseeable Development Scenario combined with the likelihood that most disturbances would also occur outside of any given IRA, it is expected that negative impacts to primitive and semi-primitive recreation would be minimal, but there is potential for irreversible impacts to these forms of recreation.

5) Habitat for threatened, endangered, proposed, candidate and sensitive species and for those species dependent on large undisturbed areas of land

This is analyzed under the Wildlife section of this document.

6) Reference landscapes

Reference landscapes are largely undisturbed landscapes retaining natural character and with naturally functioning ecosystems. These areas can be used as comparison areas that may be useful to study the effects to more intensively managed areas. Disturbances and structures such as roads, pipelines, powerlines, and drill pads could alter these characteristics, making the area no longer viable as a reference landscape. Due to the limited amount of disturbance of the Reasonably Foreseeable Development Scenario, combined with the likelihood that most disturbances would also occur outside of any given IRA, most of the IRAs in the project area would not be impacted and still be capable of serving as reference areas; but it is possible that small portions of some IRAs may be significantly altered and no longer be suitable as reference landscapes.

7) Natural appearing landscapes with high scenic quality

Under this alternative the potential for disturbance and off-lease structures could certainly change the natural appearance of these landscapes, degrading the scenic quality. Also, the potential for drilling within IRAs could impact the natural appearance of these IRAs. However, due to the limited amount of disturbance of the Reasonably Foreseeable Development Scenario, combined with the likelihood that most disturbances would also occur outside of any given IRA, most of the IRAs in the project area would not be impacted. There is a potential for localized adverse impacts, which could alter the natural appearance and scenic quality in some IRAs.

8) Traditional Cultural Properties and Sacred Sites

This is analyzed in the Cultural section of this document.

9) Other Locally Identified Unique Characteristics

There are few unique or outstanding individual features in the project area, but the remoteness and wild quality of many of these roadless areas is unique. This quality could be altered by off-lease disturbances as well as drilling in IRAs. There are impressive rock formations, a variety of natural vegetation types, and remote high grasslands. A small number of new roads or structures would have little effect to these features.

4.2.4.2. **Wilderness Attributes**

1) Natural integrity

There is evidence of historical mining in some of the roadless areas, but many are still intact with very few visible disturbances. Historical and current cattle grazing have left an impact on most of these roadless areas, so the natural integrity has been compromised to some extent. Still, structures associated with grazing and other uses are rare and dispersed, leaving most of the roadless areas with medium to high natural integrity. Currently recreation is generally occurring mostly near roads with very little affect to the natural integrity of roadless areas. Any structures or disturbances associated with off-lease activity, or drilling, would potentially diminish this characteristic. Given the Reasonably Foreseeable Development Scenario, combined with the likelihood that most disturbance would also occur outside of any given IRA, adverse effects would be and minimal.

2) Apparent naturalness

Apparent naturalness has been slightly reduced by the same issues affecting natural integrity. Development of roads and structures could negatively alter this characteristic. Any drill site and associated disturbances would certainly adversely affect apparent naturalness. Even given the Reasonably Foreseeable Development Scenario, there is a potential that the apparent naturalness of any of the unprotected roadless areas could be altered.

3) Remoteness

These roadless areas are all remote, with some ranching and mining developments occasionally visible, but not widespread. A small number of off-lease developments would not significantly alter these characteristics, but visible roads, pipelines, powerlines or other linear features would certainly take away from this characteristic. Analyzing the Reasonably Foreseeable Development Scenario, combined with

the likelihood that most disturbances would also occur outside of any given IRA, adverse impacts to remoteness are expected to be minimal.

4) Solitude

Roadless areas are generally undeveloped and seldom visited in this region. One can find a feeling of solitude in any of these roadless areas. The wild and remote feeling of eastern Nevada is very rare. A small number of developments would have minimal impact to this characteristic, but larger scale disturbances and linear features would certainly take away from the solitude of the area. Analyzing the Reasonably Foreseeable Development Scenario, combined with the likelihood that most disturbances would also occur outside of any given IRA, adverse impacts to solitude are would be minimal and localized.

5) Opportunities for primitive recreation

This alternative allows for roads and other off-lease disturbances as well as potential developments with in some IRAs, which could negatively impact primitive recreation. These developments would be visible to the recreating public, diminishing the quality of a primitive experience. A primitive recreation experience is one where the visitor sees little evidence of the works of humans; there are many places in the concerned roadless areas where this experience can be found. There are areas where mining, grazing, motorized recreation and other evidence of humans exist, but these are dispersed. Any developments would negatively impact these opportunities even given the Reasonably Foreseeable Development Scenario, combined with the likelihood that most disturbances would also occur outside of any given IRA. Abundant opportunities for primitive recreation would still exist in these IRAs, but there could be some loss of opportunity in smaller IRAs.

6) Special feature (ecological, geologic, scenic, or historical)

There are few unique or outstanding individual features in the project area, but the remoteness and wild quality of many of these roadless areas is unique. This quality could be altered by off-lease disturbances or associated impacts of leasing. There are impressive rock formations, a variety of natural vegetation types, and remote high grasslands. A small number new roads or structures would have little effect to these features.

7) Manageability (as wilderness)

Any feature constructed on a roadless area will certainly diminish manageability as a Wilderness area, particularly a road that would provide potential incursion points. View from a large scale, if structures and miles of new roads are kept to a minimum, small segments of roadless areas may be less manageable as Wilderness, but large areas would be intact.

4.2.5. Cumulative Effects

Cumulative impacts were assessed over the entire acreage of the roadless areas. Past activities that have impacted the roadless character of the area include livestock grazing, wild horses, road construction, homesteading, oil and gas exploration, mineral exploration, and early mining projects. Ongoing activities include recreational uses, off-highway vehicle use, road maintenance, grazing, and minerals exploration and development. Combined, these actions have led to noticeable effects, primarily in the lower elevation lands. Over the reasonably foreseeable future, little change from current uses is expected except for oil and gas leasing activities. Overall, the quality and integrity of roadless areas will remain high except for limited areas impacted by all activities and development. For most of the roadless and wilderness

characteristics cumulative effects vary little from the specific effects analyzed above. However, there are some instances where oil and gas development, combined with ongoing disturbances associated with mining, recreation, population growth, grazing and other national forest uses, could increase potential adverse impacts.

4.2.5.1. Roadless Area Characteristics

1) High quality or undisturbed soil, water, and air

Grazing, mining, road construction and recreation have led to some disturbances, but with little measurable effect to resource quality. Given reasonably foreseeable conditions there is little likelihood that adverse impacts could occur, though there is potential that cumulatively the associated disturbances of oil and gas leasing could combine with other ongoing impacts to have some localized adverse effects.

2) Primitive, semi-primitive non-motorized and semi-primitive motorized classes of dispersed recreation

Combined with increased motorized use from full-sized vehicles and OHVs, as well as other developments, there is a potential for oil and gas development to reduce opportunity for non-motorized recreation. These impacts would likely be localized and occur in areas that are impacted by motorized recreation, grazing and other disturbances.

3) Reference landscapes

As recreation pressures increase there are fewer areas that qualify as good reference landscapes. Many of the IRAs in the roadless area still possess this quality, but pressures from recreation, grazing, and other developments are gradually degrading these reference landscapes. Given the foreseeable development scenario, it is not likely that oil and gas development would hasten this process, but localized areas could be adversely impacted by the combination of disturbances.

4) Natural appearing landscapes with high scenic quality

The bulk of the IRAs should retain natural appearance even given the combination of disturbances that may affect them. Localized areas that are directly disturbed by oil and gas development will likely lose natural appearance particularly combined with other ongoing disturbances.

4.2.5.2. Wilderness Attributes

1) Natural integrity

Most IRAs should retain natural integrity even given the combination of disturbances that may affect them. Localized areas that are directly disturbed by oil and gas development will likely be more affected particularly combined with other ongoing disturbances. These adverse impacts will occur in small areas where development proceeds, leaving most IRAs unaffected.

2) Apparent naturalness

This quality is impacted in some small areas and will likely continue to decrease as more recreation and associated disturbances, such as route proliferation, increase. Combined with disturbances associated with oil and gas development as well as other existing and foreseeable impacts from other national forest uses, the landscape may not appear natural in localized areas.

3) Remoteness

In most of the IRAs, particularly the larger ones, opportunities for remoteness and solitude will continue to be abundant. Cumulatively oil and gas development, motorized recreation, grazing, mining, road development and other forest uses, may reduce these opportunities in smaller IRAs and those areas of larger IRAs where oil and gas development occurs.

4) Opportunities for primitive recreation

Oil and gas development could reduce primitive recreation opportunities. Off-lease disturbances as well as potential developments within some IRAs, could negatively impact primitive recreation. These developments would be visible to the recreating public, diminishing the quality of a primitive experience. A primitive recreation experience is one where the visitor sees little evidence of the works of humans. Currently there are many places in the concerned roadless areas where this experience could be found. Also there are areas where mining, grazing, motorized recreation and other evidence of humans exist, but these are dispersed. Adding these developments together with oil and gas development it is likely that in the short term (and potentially longer term), this opportunity could be diminished.

5) Manageability (as Wilderness)

Any disturbance, particularly roads, can make an area less manageable. Disturbances associated with oil and gas combined with increased motorized recreation and other developments could make small portions of these roadless areas less manageable as potential wildernesses. However the bulk of the roadless areas, particularly the larger ones, should retain this characteristic given foreseeable cumulative effects.

4.3. Impacts to Recreational Setting Sensitive Resource Components

4.3.1. **Alternative 1: No Action/No Lease**

Under the no-action alternative recreation settings would not change, and recreation opportunities would remain about the same. Slight increases in developed and undeveloped site use can be expected as population pressures from the Las Vegas and Reno, Nevada; and Utah areas increase.

4.3.2. **Alternative 2: Forest Plan with Maximum Protection**

Under this alternative areas with primitive settings would have a NSO requirement, and therefore disturbance would be minimal. Off-lease disturbance such as roads, pipelines and powerlines could occur within areas that have recreation opportunity spectrum Primitive (P) setting. Areas with Semi-Primitive Non-Motorized (SPNM) settings have a CSU stipulation that would reduce impacts from development. Road building and the introduction of the “sights and sounds” of lease activities in P and SPNM settings may degrade the settings in local areas, and may be beyond the limit of these classifications.

Areas with RN/SPM are not restricted beyond Standard Lease Terms and *Forest Plan* requirements. Road building and the introduction of the “sights and sounds” of lease activities may degrade the settings in local areas, but not beyond the limits of those classifications.

Overall, the alternative will have slight and short-term effects on the recreation settings. The additional road building will not change the setting long term, and may add additional recreational driving opportunities by adding and/or maintaining routes. These effects are slight and will have no observable difference to the general trends described for the no-action alternative.

4.3.3. Alternative 3: Forest Plan with Moderate Protection

This alternative has the same effects as Alternative 2.

4.3.4. Alternative 4: Forest Plan

Under this alternative, areas with a primitive setting would continue to be protected by the NSO stipulations. Off-lease disturbance such as roads, pipelines and powerlines could occur within areas that have recreation opportunity spectrum Primitive (P) setting. Areas with SPNM, SPM and RN settings have Standard Lease Terms that would follow *Forest Plan* guidance. Road building and the introduction of “sights and sounds” of lease activities in P and SPNM settings may degrade the settings in local areas, and may be beyond the limit of these classifications. Road building and the introduction of the “sights and sounds” of lease activities in RN/SPM settings may degrade the settings in local areas, but not beyond the limits of those classifications.

4.3.5. Cumulative Effects

Cumulative impacts were assessed over the entire acreage of the Project Area. Past activities that have impacted the recreational settings of the area include livestock grazing, road construction, homesteading, oil and gas exploration, mineral exploration and early mining projects. Ongoing activities include recreational uses, off-highway vehicle use, road maintenance, grazing and minerals exploration and development. Combined, these actions have led to noticeable effects, primarily in the lower elevation lands and drainages. Over the reasonably foreseeable future, little change from current uses is expected except for oil and gas leasing activities. Overall, the quality and integrity of the recreational settings would remain high except for limited areas impacted by all activities and development.

4.4. Impacts to Scenic Resource Sensitive Resource Component

4.4.1. Alternative 1: No Action/No Lease

The no-action alternative will not affect Scenic Resources.

4.4.2. All Action Alternatives

All action alternatives treat scenic resources the same; potential effects of the proposal on sensitive scenic resources are minimal, and fully mitigated with this level of protection.

In areas classified as Retention (R), NSO stipulations would apply. Off-lease disturbance such as roads, pipelines and powerlines could occur within areas that have Retention visual quality objective (VQO). Road building and the introduction of the “sights and sounds” of lease activities in Retention areas may degrade the landscape quality and may be beyond the limit of this classification.

In areas classified as Partial Retention (PR), Controlled Surface Use stipulations would apply. This CSU will require that the visual effects be mitigated during activity to reduce the impact. Road building and the introduction of the “sights and sounds” of lease activities in Partial Retention areas may degrade the landscape quality, but would not be beyond the limit of this classification.

In areas classified as Modification (M) or Maximum Modification (MM), Standard Lease Terms would apply. Most development is likely to occur in areas and would be noticeable to most viewers and would detract from the scenic quality of the area. These activities would not be beyond the limits of these classifications.

Any disturbances related to drilling would be localized and short term. Production activities and disturbance would likely be long term, but would be less intrusive than drilling operations due to fewer and smaller structures, reduced vehicle traffic, less noise and light intrusion, and reduced size of well head area. Interim and final reclamation would restore the disturbance to natural conditions that blend in with existing terrain.

The Grant-Quinn Canyon and White Pine Divisions are known for their low light levels and clear night skies. Introduced light from drilling and operational sources could have a negative impact on these qualities. Most activities that would generate artificial light would be concentrated in areas already the most disturbed by roads and/or other activities. These areas tend to be in drainages and areas without high relief. This will tend to screen the light and mitigate the intrusion. The Reasonably Foreseeable Development Scenario anticipates exploration activity at a few sites at any one time and short term. If a field is developed, continuous lights would not be present. The overall effect is slight, but is an increase from the current light values in the Project Area.

4.4.3. Cumulative Effects

Cumulative impacts to scenic resources were assessed over the entire acreage of the project area. Past activities that have impacted the scenic resources of the area include livestock grazing, road construction, homesteading, oil and gas exploration, mineral exploration and development, and early mining projects. Ongoing activities include recreational uses, off-highway vehicle use, road maintenance, grazing and minerals exploration and development. Combined, these actions have led to noticeable effects, primarily in the lower elevation lands and drainages. Over the reasonably foreseeable future, little change from current uses is expected except for oil and gas leasing activities. Overall, the quality and integrity of the scenic resources would remain high except for limited areas impacted by all activities and development.

4.5. Impacts to Visitor Experience and General Recreation

4.5.1. Alternative 1: No Action/No Lease

Under the no-action alternative, visitor experiences would change slightly as visitor use increases over time, with more visitors from Las Vegas coming to the area to recreate.

4.5.2. Alternative 2: Forest Plan with Maximum Protection

Under this alternative lands available for leasing have various levels of protection, particularly roadless areas. There would be some impact to the visitor experience in areas where visible disturbance, sights, and sounds associated with oil and gas development might occur. There is some hunting in the fall season with minimal outfitter/guide operations. Outfitter/guides are allowed to operate throughout the district, but use reports show that there is very little activity in the project area. Prime hunting areas and areas where outfitter/guides might operate are likely within the roadless areas, so there would likely be no impact to these operations under this alternative.

4.5.3. 1.5.3 Alternative 3: Forest Plan with Moderate Protection

Under this alternative, impacts to the visitor experience, hunters, and outfitter/guide operations would be similar to Alternative 2. There is potential for drilling and development in more of the roadless areas, which could have an impact to visitors. There is some hunting in the fall season with minimal outfitter/guide operations. Outfitter/guides are allowed to operate throughout the district, but use reports show little activity in the project area. Prime hunting areas and areas where outfitter/guides might operate are likely within the roadless areas. This alternative provides protection for the three roadless areas with

primitive characteristics, but could allow development in other roadless areas. There may be minimal impacts to visitors, hunters, and outfitter/guide operations, but there is still a great deal of area where visitors would not encounter any oil/gas related developments.

4.5.4. Alternative 4: Forest Plan

Under this alternative all of the Forest System Lands in the analysis area would be administratively available to leasing except for congressionally designated Wilderness areas. The possibility of drilling sites or production areas in game habitat might adversely affect hunting opportunities for individual hunters and outfitter/guide operations. Outfitter/guide operations in the area are currently minimal, but there is a potential that this may increase in the future. Possible impacts from oil/gas operations under this alternative would likely have adverse effects to outfitter/guide operations in the future, or might cause outfitter/guides to operate elsewhere. Sights and sounds associated with oil/gas operations would also adversely affect the overall recreation experience of visitors to the area.

4.5.5. Cumulative Effects

Cumulative impacts were assessed over the entire acreage of the project area. Past activities that have impacted the visitor experience include livestock grazing, road construction, homesteading, oil and gas exploration, mineral exploration, and early mining projects. Ongoing activities include recreational uses, off-highway vehicle use, road maintenance, grazing and minerals exploration and development. Combined, these actions have led to noticeable effects, primarily in the lower elevation lands and drainages. Over the reasonably foreseeable future, little change from current uses is expected except for oil and gas leasing activities. Overall, the quality of visitor experiences would remain high except for limited areas impacted by all activities and development.

5. SOCIO-ECONOMIC, HERITAGE RESOURCES, AND OTHER RESOURCE VALUES

5.1. Impacts to Socio-Economic Sensitive Resource Components

This section discusses the potential impacts of the alternatives on the social and economic conditions of the project area as described in Chapter 3. The analysis focuses on the impacts to populations, employment, and fiscal characteristics. In addition, there is a discussion of cumulative impacts.

The issue of leasing constraints is critical, not only for the protection of natural resources, but for attracting investors in oil and gas development.

Oil and gas exploration and development is considered a high risk investment. In Nevada, the risk increases due to the complicate geology of the Basin and Range Province. Oil producing strata have been folded and fractured. Remaining reserves are isolated and largely structurally controlled.

5.1.1. Alternative 1: No Action/No Lease

In the next 5 to 10 years under Alternative 1, no oil and gas exploration would occur in the White Pine and Grant-Quinn Divisions of the H-T NF. Oil and gas development operations would continue in Railroad Valley and Pine Valley; however, the downward trend in decreased oil production is expected to continue as reserves are depleted.

5.1.2. Alternative 2: Forest Plan with Maximum Protection

Alternative 2 allows for limited oil and gas leasing in the project area while protecting resource values through natural resource stipulations.

Populations. Initial exploration in the project area would most likely attract existing oil and gas workers residing in the project area or out-of-state workers who may not plan to permanently reside in the project area. No substantial permanent change is expected in the population of communities near areas of oil and gas exploration and development, although a small temporary influx may occur during exploration and start-up phases.

Employment. Full-time oil and gas workers in Nevada usually follow the latest projects, are from out-of-state, and may be employed in several states in a single year. Part-time oil and gas workers often come from the local workforce, employed full-time in another capacity. Exploratory drilling increases the size of the workforce in an area, which results in a positive impact to the economy in the form of increased demand for food, gas, lodging, and supplies.

The Reasonably Foreseeable Development (RFD) Scenario hypothesizes that there would be 20 exploration wells drilled in the project area; 4 of which would produce. These wells would be drilled over a period of time and most likely would not be drilled concurrently. This would not create a substantial amount of employment (about four jobs for local residents and four jobs for out-of-state specialists).

Impacts to Local Businesses. Many local businesses would benefit from any oil and gas exploration and development. Initially, motels, RV parks, restaurants, service stations, Laundromats, construction companies, repair services and other businesses would support oil and gas exploration activities. Industry sources estimate geological field crews of 2 to 3 workers would expend \$200 to \$300 a day in the local community; geophysical exploration crews of 5 to 10 workers would expend about \$500 to \$1,000 a day in the local community; and exploratory drilling crews of 4 to 8 workers would expend about \$400 to \$800 a day in the local community. While expected to be intermittent, exploration activities over time would have a small to moderate impact on the economic stability of the area. If new discoveries were made and fields brought into production, economic benefits would extend over a longer period of time.

While the majority of economic benefits would be viewed as positive by the business sector, there is the potential for minor negative impacts to be felt by businesses that rely on outdoor recreation and tourism. Businesses such as outfitters and guides rely on federally-managed lands including National Forest System lands to operate. Development on these lands, such as oil and gas drilling, may affect how an outfitter/guide operates or whether or not some tourists decide to recreate in the area. Any impacts are expected to be minimal due to small amount of area impacted under the RFD, the short-term nature of exploration, and the large extent of federally-managed lands within the three county area.

Revenues to Counties. Under Alternative 2, there is the potential for oil and gas revenues to be returned to Nye, Lincoln, and White Pine Counties if leasing were to occur and new oil fields brought into production over the next 10 to 20 years. A portion of the revenues generated by both public lands leasing fees and production royalties are distributed back to the counties by the Federal government for use in county general and school funds. Due to the uncertainty of the amount of money the government would receive from leasing and the discovery of new oil fields it is impossible to predict the amount of revenues, if any, that may be returned to the counties.

5.1.3. Alternative 3 and 4: **Forest Plan with Moderate Protection and Forest Plan**

Alternatives 3 and 4 would allow for leasing of project area land with fewer constraints than Alternative 2, resulting in an increase in the land acreage available for leasing and a more attractive investment for oil and gas developers. The implementation of the Reasonably Foreseeable Development Scenario is less expensive and time consuming under Alternatives 3 and 4. More land might be leased for oil and gas exploration under Alternative 3 than under Alternative 2. More land would be leased for oil and gas exploration under Alternative 4 than under Alternative 3. Under Alternatives 3 and 4, the impacts to all elements of the social and economic environment would be similar to Alternative 2; no substantial social or economic effects or changes would occur to the local economies.

5.1.4. Cumulative Effects

The cumulative effects of oil and gas development on social and economic conditions would depend on a broad range of factors.

Local Populations. Populations for each of the three counties would continue to change in response to many factors including the overall business climate, growth in nearby Clark County which impacts regional trends, and trends in retirement as the “baby boomers” reach retirement age.

Overall, statewide population growth in Nevada is expected to average 1.5 percent from 2002 to 2022. For White Pine County, a decrease in population is predicted with an annual average decrease of 1.4 percent over the same time period. Small annual increases are predicted for both Nye and Lincoln Counties, with 2.0 percent and 0.8 percent, respectively (Nevada Department of Taxation).

Employment. Employment rates for each of the three counties would continue to change in response to many factors including the local business climate, as well as national and world economic indicators.

In 2002 the total employment for all occupations in Nevada was approximately 130,000 jobs. The number of jobs is expected to rise to approximately 167,000 (28 percent) by 2012 (Nevada Department of Employment, Training, and Rehabilitation 2002).

Impacts to Local Businesses. The economic performance of local businesses within the three counties is dependent on a number of economic circumstances. In December of 2004, the State of Nevada forecasted that the State’s strong economic growth would continue in the near future (State of Nevada Economic Forum). The local economy as a whole is expected to mirror statewide trends due to a robust mineral extraction (including oil and gas) industry, tourism rebounding after 2001, and strong growth in housing markets.

Revenues to Counties. As described in Chapter 3, oil and gas leasing and production provides revenues to the county government where leasing and production occurs. These revenues fluctuate in response to the annual production of oil and market prices for crude oil. While oil production is expected to continue in Railroad Valley in the foreseeable future, changes to the revenues generated cannot be quantified.

5.2. Impacts to Heritage Resources Sensitive Resource Components

All action alternatives would include the avoidance or mitigation of significant prehistoric and historic archaeological resources, and traditional cultural properties, under the *National Historic Preservation Act* of 1966, as amended, 36 Code of Federal Regulations 800, and Executive Order 11593. In addition, at the Application for Permit to Drill (APD) stage, a cultural survey is required on all areas proposed for

ground-disturbing activities and their Area of Potential Effect before such activities commence. If heritage resources are identified, they will be avoided or will be mitigated. Standard stipulations require the lessee to report and protect all heritage resources found during construction.

5.2.1. Alternative 1: No Action/No Lease

The no-action alternative will not affect heritage resources.

5.2.2. Alternatives 2, 3 and 4: All Action Alternatives

Impacts would be the same under these alternatives, since most of the significant heritage resources can be effectively protected through compliance with *National Historic Preservation Act* (NHPA). The Standard Lease Terms would apply to all alternatives. Standard Lease Terms (SLT) means that any undertaking associated with this lease will be done in compliance with the following legislation: Executive Order 13007 (Indian Sacred Sites 1996); the *Native American Graves Protection and Repatriation Act* of 1990; the *Archaeological Resources Protection Act* of 1979; the *Archaeological Data Preservation Act* of 1974; the *National Historic Preservation Act* of 1966 (as amended through 2000) (NHPA); the *Historic Sites Act* of 1935; and the *Antiquities Act* of 1906.

Project specific inventories would be performed prior to any ground-disturbing activities. When areas of disturbance are known, a site-specific survey would be conducted to identify, inventory, interpret, evaluate, and manage heritage resources that may be impacted.

Where heritage resources might be affected by oil and gas activity, mitigation measures could be employed to avoid or mitigate impacts to the site prior to disturbance. Also, under revised Section 106 (June 1999) (NHPA), coordination and consultation with the Nevada State Historic Preservation Office (SHPO) and local tribal representatives is required and necessary.

5.2.3. Cumulative Effects

While many archaeological sites can be avoided or mitigated according to standard methods and Standard Lease Terms, cumulative effects may still occur if an oil or gas field were developed in an area of high site density or within a significantly large site. According to the Regulations pertaining to the 1992 Amendments to the NHPA, mitigation of a site through excavation or other means is considered an "Adverse Effect" to the site (36 CFR 800.5). The identification and development of an oil and gas field in the vicinity of, or within, large or important groups of archaeological sites such as an historic mining district or extensive prehistoric campsite could not be "mitigated" without extensive adverse effects to sites.

These effects are compounded by the size of a developed field and how it relates within the historic and prehistoric sites. The sites may be avoided, for example, but it may not be possible to avoid crossing or traversing along interconnecting, significant, historic stage coach and freight roads that may run through a complex of sites. The setting of an historic site or sites may also be compromised even while sites are mitigated through excavation. The presence of roads, pipelines, pumps, and related oil and gas features could significantly impact the interpretive and recreational potential of sites such as the White Pine Mining District which have both a management plan and an interpretive plan. Elsewhere, the proliferation of roads associated with a developed oil and gas field lend themselves to cumulative effects related to opening the area to increased vehicular traffic and incidental site and artifact destruction or theft.

With so little information known about the locations of archaeological sites within the area of this EIS, couple with the uncertainty of where and if oil and gas drilling may occur, it can only be concluded that if a field were to be developed within an area having large or many archaeological sites, cumulative effects could be extensive and adverse.

5.3. Impacts to Other Sensitive Resource Components – Access and Transportation

5.3.1. Alternative 1: No Action/No Lease

Under the no-action alternative, weathering roads surfaces and vegetation growth will continue to degrade routes faster than maintenance will restore them. Access will continue to diminish, over time.

5.3.2. Alternative 2: Forest Plan with Maximum Protection

Road construction and maintenance of existing roads in the vicinity of exploration and development will have a positive effect on maintaining access. However, this improvement will be slight and in limited areas.

5.3.3. Alternative 3: Forest Plan with Moderate Protection

Slightly more roads could be constructed and maintained under this alternative than Alternative 2, since exploration could be in more remote locations; however the difference is minor.

5.3.4. Alternative 4: Forest Plan

This alternative differs from Alternative 3 only in that slightly more areas could have improved access. Given the relatively small areas anticipated to be developed, there is no discernable difference in effects.

5.3.5. Cumulative Impacts

Cumulative impacts were assessed over the entire acreage of the project area. Past activities that have impacted the access and transportation system include road maintenance, grazing permittee, hunters and recreationists, and historic and recent mining projects. Ongoing activities include recreational uses, off-highway vehicle use, grazing, and minerals exploration and development.

Over the reasonably foreseeable future, little change from current uses is expected. Combined, these actions have led to noticeable effects with user-generated roads and road construction for mining and exploration purposes. Overall, the amount and maintenance of roads are expected to increase slightly if production wells are established. During oil and gas exploration there could be a slight increase in access roads available to the public. However, after exploration and development, these roads would most likely be reclaimed and road access would be reduced back to the existing transportation system.

6. SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

NEPA requires consideration of “the relationship between short-term uses of man’s environment and the maintenance and enhancement of long-term productivity” (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic,

and other requirements of present and future generations of (i.e., roads, well pads, pipelines) needed for exploration drilling and/or production of oil and gas would lead to the short-term loss of plant communities and wildlife habitat during the life of any lease activities. BMPs and other means of mitigation would be used to limit these short-term losses. Following completion of activities and reclamation the productivity of the affected lands would be restored.

7. UNAVOIDABLE ADVERSE EFFECTS

Under all of the action alternatives there would be unavoidable adverse effects to resources within the project area. These unavoidable effects include:

- Impacts to plant communities,
- Loss of wildlife habitat,
- Disturbance to wildlife,
- Impacts to the character of inventoried roadless areas,
- Impacts to the Recreational Opportunity Settings,
- Impacts to the quality of the landscape character,
- Impacts to soils, and
- Impacts to water quality and quantity.

These adverse effects are discussed in detail in the previous sections of this chapter.

8. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time, such as the temporary loss of timber productivity in forested areas that are kept clear for use as a powerline right-of-way or road.

The production and recovery of oil and gas reserves would be an irreversible commitment of resources under all of the action alternatives.

The development of facilities and improvements needed for exploration drilling and/or production of oil and gas would lead to the irretrievable loss of plant communities, grazing forage, and wildlife habitat during the life of any lease activities. Following completion of activities and reclamation the productivity of the affected lands would be restored.

9. OTHER REQUIRED DISCLOSURES

9.1. National Environmental Protection Act (NEPA)

NEPA at 40 CFR 1502.25(a) directs “to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with ...other environmental review laws and executive orders.”

9.2. National Historic Preservation Act

Coordination and consultation with the Nevada State Historic Preservation Office (SHPO) and local tribal representatives would be undertaken prior to allowing any ground disturbing activities (APD stage). This coordination and consultation would ensure full compliance with the NHPA.

9.3. Endangered Species Act

Coordination and consultation with the USFWS would be undertaken prior to allowing any ground disturbing activities (APD stage). This coordination and consultation would ensure full compliance with the ESA.

9.4. Executive Order 12898 (Environmental Justice)

Executive Order 12898 (Environmental Justice) directs Federal agencies to identify and address the issue of environmental justice, which concerns adverse human health and environmental effects of agency programs that disproportionately affect minority and low-income populations. Nearby towns and communities include Ely, McGill, Ruth, Duckwater, Currant, the Ely Indian Colony, Lund, Preston, and Eureka. Shoshone Indians are the primary Native Americans associated with the area; Western Shoshone Indians historically and currently use various sites in project area. Minority populations associated with the area include Native American, African American, Asian/Pacific Islander, and Hispanic, as well as other non-Caucasian races. Typical of many rural areas, the region includes lower-income populations that range broadly across majority and minority ethnic groups.

Implementation of the action alternatives for the White Pine and Grant-Quinn Project Area would not cause adverse health, social, or environmental effects that would disproportionately affect minority and low-income populations in the surrounding communities and towns.

CHAPTER FIVE: CONSULTATION AND COORDINATION

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2 DISTRIBUTION OF THE ENVIRONMENTAL IMPACT STATEMENT

The draft environmental impact statement has been distributed to individuals who specifically requested a copy of the document. In addition, copies have been sent to Federal agencies, federally recognized American Indian Tribes, state and local governments, and organizations representing a wide range of views regarding oil and gas leasing. The draft environmental impact statement was also made available to the general public via the Forest Service website. (<http://www.fs.fed.us/r4/htnf/projects/>). A copy of the mailing list is available in the project record.

This final environmental impact statement is being distributed to individuals who specifically requested a copy of the document. In addition, copies have been sent to Federal agencies, federally recognized American Indian Tribes, State and local governments, and organizations representing a wide range of views regarding oil and gas leasing. This final environmental impact statement is also available to the general public via the Forest Service website. (<http://www.fs.fed.us/r4/htnf/projects/>). A copy of the mailing list is available in the project record.

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APPENDIX A:
STANDARD LEASE TERMS
(BLM FORM 3100-11)
AND LEASE STIPULATIONS

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1. INTRODUCTION

The following information pertaining to lease stipulations is taken from the booklet, *Uniform Format for Oil and Gas Lease Stipulation*, prepared by the Rocky Mountain Regional Coordinating Committee, (March 1989). The Bureau of Land Management (BLM) and the Forest Service developed these guidelines.

Stipulations are provisions that modify standard lease rights and are attached to and made of a lease. Stipulations, as such, are neither "standard" nor "special", but rather a necessary modification of the terms of the lease. The forms, given at the end of this appendix, provide for standardized structure, wording, and usage. In order to accommodate the variety of resources encountered on Federal lands, these stipulations are categorized as to how the stipulation modifies the lease rights, not by the resource(s) to be protected. What, why, and how this mitigation/protection is to be accomplished is determined by the land management agency through land use planning and *National Environmental Policy Act* (NEPA) analysis.

2. IMPLEMENTATION

If it is determined that, upon weighing the relative resource values, uses, and/or users identified, conflict with oil and gas operations and cannot be adequately managed and/or accommodated on other lands, a lease stipulation is necessary. Land use plans serve as the primary vehicle for determining the necessity for lease stipulations (BLM Manual 1624). Documentation of the necessity for a stipulation is disclosed in planning documents or through site-specific analysis. Land use plans and/or NEPA documents also establish the guidelines by which future waivers, exceptions, or modifications may be granted. Substantial modification or waiver subsequent to lease issuance is subject to public review for at least a 30-day period in accordance with Section 5102.f of the *Federal Onshore Oil and Gas Leasing Reform Act* of 1987 (FOOGLRA).

Stipulations may be necessary if the authority to control the activity on the lease does not already exist under laws, regulations, or orders. It is important to recognize that the authorized officer has the authority to modify the site location and design of facilities, control the rate of development and timing of activities as well as require other mitigation(s) under Sections 2 and 6 of the standard lease terms (BLM Form 3100-11, Attachment A-1) and 43 CFR 3101.1-2.

The necessity for individual lease stipulations is documented in the lease-file record with reference to the appropriate land use plan or other leasing analysis document. The necessity for exceptions, waivers, or modifications also will be documented in the lease-file record through reference to the appropriate plan or other analysis. The uniform format for stipulations should be implemented when amendments or revisions of land use plans are prepared or by other appropriate means.

The uniform format for stipulations is designed to accommodate most existing stipulations by providing space to record the local mitigation objectives. The stipulations have been developed for the following categories:

- No surface occupancy (NSO),
- Timing or seasonal restriction (TSR), and
- Controlled surface use (CSU).

This guidance also includes the use of lease notices. Also, there is provision for special or unique stipulations, such as those required by prior agreements between agencies when the standardized forms are not appropriate. In all cases, use of the uniform forms for stipulations requires identification of specific resource values to be protected and description of specific geographical area covered. Stipulations attached to noncompetitive leases require the applicant's acceptance and signature.

3. DEFINITIONS

Conditions of approval (COA) - Conditions or provisions (requirements) under which an Application for a Permit to Drill or a Sundry Notice is approved.

Controlled Surface Use (CSU) - Use and occupancy is allowed (unless restricted by another stipulation), but identified resource values require special operational constraints that may modify the lease rights. CSU is used for operating guidance, not as a substitute for the NSO or timing stipulations.

Exception - Case-by-case exemption from a lease stipulation. The stipulation continues to apply to all other sites within the leasehold to which the restrictive criteria apply.

Lease Notice - Provides more detailed information concerning limitations that already exist in law, lease terms, regulations, or operational orders. A Lease Notice also addresses special items the lessee should consider when planning operations, but does not impose new or additional restrictions. Lease Notices attached to leases should not be confused with Notices to Lessees (NTL). (See 43 CFR 3160.0-5)

Modification - Fundamental change to the provisions of a lease stipulation, either temporarily or for the term of the lease. Therefore, a modification may include an exemption from or alteration to a stipulated requirement. Depending on the specific modification, the stipulation may or may not apply to all other sites within the leasehold to which the restrictive criteria apply.

No Surface Occupancy (NSO) - Use or occupancy of the land surface for fluid mineral exploration or development is prohibited to protect identified resource values. The NSO stipulation includes stipulations that may have been worded as "No Surface Use/Occupancy," "No surface disturbance," "Conditional NSO," and "Surface Disturbance or Surface Occupancy Restriction (by location)." NSO stipulations apply to the location of well sites, production

facilities, tank batteries, and pipelines within the lease block. NSO does not apply to Geophysical explorations, roads, transmission pipelines, and power lines.

Notice to Lessees (NTL) - The NTL is a written notice issued by the authorized officer. NTLs implement regulations and operating orders, and serve as instructions on specific item(s) of importance within a State, District, or Area.

Stipulation – Aa provision that modifies standard lease rights and is attached to and made a part of the lease.

Timing Limitation (Seasonal restriction) - Prohibits surface use during specified time periods to protect identified resource values. This stipulation does not apply to the operation and maintenance of production facilities unless the findings of analysis demonstrate the continued need for such mitigation and that less stringent, project-specific mitigation measures would be insufficient.

Waiver - Permanent exemption from a lease stipulation. The stipulation no longer applies anywhere within the leasehold.

4. NO SURFACE OCCUPANCY STIPULATION GUIDANCE _____

The No Surface Occupancy (NSO) stipulation is intended for use only when the stipulations are determined insufficient to adequately protect the public interest. The land use plan/NEPA document prepared for leasing must show that less restrictive stipulations were considered and determined by the authorized officer to be insufficient. The planning/NEPA record must also show that consideration was given to a no-lease alternative when applying an NSO stipulation. An NSO stipulation is not needed if the desired protection would not require relocation of proposed operations by more than 200 meters (43 CFR 3101.1-2).

The legal subdivision, distance, location, or geographic feature, and resource value of concern must be identified in the stipulation and be tied to a land use plan and/or NEPA document. Land description may be stated as; the "Entire Lease", distance from resources and facilities such as rivers, trails, campgrounds, etc.; legal description; geographic feature such as a 100-year floodplain, municipal watershed, percent of slope, etc.; special areas with identified boundaries--area of critical environmental concern, wild and scenic river, etc.; or other description that specifies the boundaries of the lands affected. The estimated percent of the total lease area affected by the restriction must be given if no legal or geographic description of the location of the restriction is given. In other cases the estimated percent is optional. (See Example A-1).

Land use plans and/or NEPA documents should identify the specific conditions for providing waivers, exceptions, or modifications to lease stipulations. Waivers, exceptions, or modifications must be supported by appropriate environmental analysis and documentation, and subject to the same test used to initially justify the imposition of this stipulation. Language may be added to the NSO stipulation form to provide the lessee with information or circumstances under which waivers, exceptions, or modifications would be considered. A waiver, exception, or modification may be approved if the record shows that circumstances or relative resource values

have changed or that the lessee can demonstrate that operations can be conducted without causing unacceptable impacts, and that less restrictive stipulations will protect the public interest. Waivers, exceptions or modification can only be granted by the authorized officer. If the waiver, exception, or modification is inconsistent with the land use planning document, that document must be amended as necessary, or the change disallowed.

If the authorized officer determines, prior to lease issuance, that a stipulation involves an issue of major concern, modification or waiver of the stipulation will be subject to public review (43 CFR 3101.1-4). The land use plan also may identify other cases when a public review is required for a waiver, exception, or modification. In such cases, wording such as the following should be added to the stipulation form to inform the lessee of the required public review: "A 30-day public notice period is required prior to modification or waiver of this stipulation."

5. TIMING LIMITATION STIPULATION GUIDANCE

The Timing Limitation Stipulation (often called seasonal) prohibits fluid mineral exploration and development activities for time periods less than yearlong. When using this stipulation, assure that date(s) and location(s) are as specific as possible. A limitation involves the prohibition of new surface-disturbing operations for periods of less than 60 days (43 CFR 3101.1-2).

The land use plan/NEPA document prepared for leasing must show that less restrictive stipulations were considered to be insufficient. The environmental effects of exploration, development, and production activities may differ markedly from each in scope and intensity. If the effects of reasonably foreseeable production activities necessitate timing limitation requirements, this need should be clearly documented in the record. The record also should show that less stringent, project-specific mitigation may be insufficient. In such cases the stipulation language should be modified on a case-by-case basis to clearly document that the timing limitation applies to all stages of activity.

The legal subdivision, distance, location, or geographic feature, and resource value of concern must be identified in the stipulation and be tied to a land use planning and/or NEPA document. The timing limitations for separate purposes may be written on separate forms or as combined stipulation. (See Example A-2.) During the review and decision-making process for Application for Permit to Drill (APD) and Sundry Notices, the date(s) and locations(s) should be refined based on current information.

EXAMPLE A-1

Serial Number _____

NO SURFACE OCCUPANCY STIPULATION

No surface occupance or use is allowed on lands described below (legal subdivision or other description).

- a. T2N, R10E SLM
Section 26, NE1/4 SW1/4

- b. T2N, R14E
Section 30: W1/2

For the purpose of:

- a. Avoidance of steep slopes exceeding 40 percent to avoid mass slope-failure and erosion.
Ely Ranger District Oil and Gas Leasing EIS

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or Forest Service Manual 1950 and 2820.)

Form #/Date

EXAMPLE A-2

Serial Number _____

TIMING LIMITATION STIPULATION

No surface use is allowed during the following time period(s); this stipulation does not apply to operation and maintenance of production facilities.

- a. May 1 to June 30
- b. November 15 to April 30

On the lands described below:

- a. T3N, R14E, Section 3, E1/2
- b. T2N, R17E, Section 2: All

For the purpose of:

- a. Protect elk calving area; Forest Plan (page ____) and EIS (page ____).
- b. Protect elk winter range. This does not apply to operation and maintenance of production facilities; Western Uinta Basin Oil and Gas Leasing EIS (page ____).

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or Forest Service Manual 1950 and 2820.)

Land use plans and/or NEPA documents should identify the specific conditions for providing waivers, exceptions, or modifications to lease stipulations. Waivers, exceptions, or modifications of this stipulation, such as continuing drilling operations into a restricted time period, must be supported with appropriate environmental analysis and documentation, and would be subject to the same test used to initially justify the imposition of this stipulation. Language may be added to the stipulation form to provide the lessee with information or circumstances under which waiver, exception, or modification would be considered. The need for one-time, case-by-case exceptions of timing limitation stipulation may arise from complications or emergencies during the drilling program. The need for timely review and decision making is great in such cases. For this reason, it is desirable that land use plans/NEPA documents clarify what review procedures and other requirements, if any, would apply in such cases.

A waiver, exception, or modification may be approved if the record shows that circumstances or relative resource values have changed or that the lessee can demonstrate that operations can be conducted without causing unacceptable impacts, and that less restrictive stipulations would protect the public interest. Waivers, exceptions or modifications can only be granted by the authorized officer. If the waiver, exception or modification is inconsistent with the land use planning document, and that document does not disclose the conditions under which such changes would be allowed, the plan or NEPA document must be amended as necessary, or the change disallowed.

If the authorized officer determines, prior to lease issuance, that a stipulation involves an issue of major concern, modification or waiver of the other cases when a public review stipulation would be subject to public review (e.g., 43 CFR 3101.1-4). The land use plan also may identify is required for waiver, exception, or modification. In such cases, wording such as the following should be added to the stipulation form to inform the lessee of the required public review: "A 30-day public notice period is required prior to modification or waiver of this stipulation."

6. CONTROLLED SURFACE USE STIPULATION GUIDANCE _____

The Controlled Surface Use (CSU) stipulation is intended to be used when fluid mineral occupancy and use are generally allowed on all or portions of the lease area year-round, but because of special values, or resource concerns, lease activities must be strictly controlled. This stipulation replaces stipulations commonly referred to as limited Surface Use stipulations. The CSU stipulation is used to identify constraints on surface use or operations that may otherwise exceed the mitigation provided by Section 6 of the standard lease terms and the regulations and operating orders. The CSU stipulation is less restrictive than the NSO (No Surface Occupancy) or Timing Limitation stipulations, which prohibit all occupancy and use on all or portions of a lease for all or portions of a year. The CSU stipulation should not be used in lieu of an NSO or Timing limitation stipulation. The use of this stipulation should be limited to areas where restrictions or controls are necessary for specific types of activities rather than all activity.

The stipulation should explicitly describe the activity that is to be restricted or controlled or the operation constraints required, and must identify the applicable area and the reason for the

requirement. The record must show that less restrictive stipulations were considered and determined to be insufficient. The legal subdivision, distance, location, or geographic feature, and resource value of concern must be identified in the stipulation and be tied to a land use plan and/or NEPA document. (See Example A-3).

Land use plans and/or NEPA documents should identify the specific conditions providing waivers, exceptions, or modifications to lease stipulations. Waivers, exceptions, or modifications of this stipulation must be supported with appropriate environmental analysis and documentation, and will be subject to the same test used to initially justify the imposition of this stipulation. Language may be added to the stipulation form to provide the lessee with information or circumstances under which waiver, exception, or modification would be considered. A waiver, exception, or modification may be approved if the record shows that circumstances or relative resource value have changed or that the lessee can demonstrate that operations can be conducted without causing unacceptable impact, and that less restrictive stipulations would protect the public interest. The authorized officer can only grant waivers, exceptions, or modifications. If the waiver, exception, or modification is inconsistent with the land use planning document, that document must be amended as necessary or the change disallowed.

If the authorized officer determines, prior to lease issuance, that a stipulation involves an issue of major concern, modification or waiver of the stipulation would be subject to public review (e.g., 43 CFR 3101.1-4). The land use plan also may identify other cases when a public review is required for waiver, exception, or modification. In such cases, wording such as the following should be added to the stipulation form to inform the lessee of the required public review: "A 30-day public notice period is required prior to modification or waiver of this stipulation."

7. SPECIAL ADMINISTRATION STIPULATION GUIDANCE

There is no required or suggested uniform format for these stipulations. They are usually provided by another agency or organization. However, other agencies are to be encouraged to use the uniform stipulation format.

Special Administration stipulations are used in situations where the three uniform stipulation forms or lease notices do not adequately address the concern. Special Administration stipulation should be used only when special external conditions, such as preexisting agreements with other agencies, require use of a "one-of-a-kind" stipulation that is not used in any other area or situation. The resource use or value, location, and specific restrictions must be clearly identified. In addition, the external agency, agreement, or preexisting use, which dictates the special restrictions, must be identified. The stipulation should state if and under what circumstances a waiver, exception, or modification may be allowed.

Examples of Special Administration stipulations are contained in the document, *Uniform Format for Oil and Gas Lease Stipulations*, through the Forest Service or BLM.

EXAMPLE A-3

Serial Number _____

CONTROLLED SURFACE USE STIPULATION

Surface occupancy or use is subject to the following special operating constraints.

- a. Any operations within this lease must be designed or located to enable the visual quality objective of partial retention to be met within one year of commencing operations.

On the lands described below:

- a. The entire lease.

For the purpose of:

- a. To meet visual quality objectives; Ely Ranger District Oil and Gas Leasing EIS.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 31 01, Forest Service Oil and Gas Regulations, 36 CFR, Sec. 228.104.)

Form #/Date

8. LEASE NOTICE GUIDANCE

Lease Notices are attached to leases to transmit information at the time of lease issuance to assist the lessee in submitting acceptable plans of operation or to assist in administration of leases.

Lease Notices are attached to leases in the same manner as stipulations; however, there is an important distinction between Lease Notices and Stipulations. Lease Notices do not involve new restrictions or requirements. Any requirements contained in a Lease Notice must be fully supported in law, regulation, standard lease terms, or onshore oil and gas orders. A Lease Notice is not signed by the lessee. Guidance in the use of Lease Notices is found in BLM Manual 3101 and 43 CFR 3101.1-3.

A lease notice should contain the following elements:

- The resource/use/value;
- The lands affected, if applicable;
- The reason(s);
- The effect on lease operations or what may be required; and
- A reference to the lease term, regulation, law or order from which enforcement authority is derived.

If a situation or condition is known to exist that could affect lease operations, there should be full disclosure at the time of lease issuance via a Lease Notice. If a lessee may be prevented from extracting oil and gas through a prohibition mandated by a specific nondiscretionary statute, such as the Endangered Species Act, then a stipulation may be used even though a Lease Notice would be sufficient. It is at the discretion of the authorized officer whether a situation is sufficiently sensitive to warrant the use of a lease stipulation. Example A-4 illustrates a Lease Notice.

EXAMPLE A-4

Serial Number _____

LEASE NOTICE

This lease was issued based on limited information regarding the water resources that may be affected by oil and gas operations. No activities can be approved that would violate the "Clean Water Amendments Act of 1972 as amended and the associated Federal and State regulations. In order to assure compliance with the applicable laws and regulations regarding the protection and non-degradation of water quality, the lessee may be required to collect flow and quality baseline information for any surface and subsurface waters that could be adversely affected, prior to approval of proposed operations. The lessee will be required to establish a monitoring program capable of identifying and measuring any affects to water flow and quality that may occur as a result of operations.

Requirements for baseline data collection and water monitoring will be determined on a site-specific basis.

Form #/Date

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APPENDIX B:

**ACTS OF AUTHORITY AND
MANDATES FOR THE
FOREST SERVICE AND
BUREAU OF LAND MANAGEMENT**

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1. INTRODUCTION

The authority of the Forest Service Authorized Officer to make leasing availability decisions is conferred by the *Leasing Reform Act of 1987* and the *Mineral Leasing Acts* (1920, 1947). The implementing regulations (36 CFR 228, subpart E) gave the authority to make these decisions to Regional Foresters. The Regional Forester has delegated that authority to the Supervisor of the Humboldt and Toiyabe National Forests. Other acts are mandates to the Forest Supervisor's that must be carried while implementing any activities on the ground.

2. BACKGROUND ACTS

A series of statutes prior to the Leasing Reform Act further establish and define the authority of the Supervisor to make these decisions. These are:

2.1. General Mining Law of 1872 (later amended by the Mineral Leasing Act of 1920)

Public lands, including National Forest System lands, valuable for oil deposits were open to entry and placer mining claims under the *General Mining Law*. (See Act of February 11, 1872, 29 Stat. 526.) The *General Mining Law of 1872* (30 USC 22-54) preceded the Organic Act and the establishment of the Forest Reserves and National Forests. The General Mining Law governs mining activity on public lands and National Forest System lands.

So many claims were filed under the *General Mining Law* that the President issued a Proclamation in 1909 withdrawing public lands from such entry, pending the enactment of legislation to protect such lands. (See *U.S. v. Midwest Oil Co.*, 59 L.Ed. 673 (1915), and *Udall v. Tallman*, 13 L.Ed. 2d 616, 628 (1965)). However, protective legislation was not enacted until the Mineral Leasing Act of 1920. (See *Boesche v. Udall*, 373 US 472, 10 L.Ed. 2d 491, 497 (1963).) This Act authorizes the Secretary of the Interior to issue leases for disposal of certain minerals (currently applies to coal, phosphate, sodium, potassium, oil, oil shale, gilsonite, and gas). The Act applies to National Forest System lands reserved from the public domain.

2.2. Mineral Resources on Weeks Law Lands

The Act of March 4, 1917 (39 Stat. 1150, as supplemented; 16 U.S.C. 520); this act authorizes the Secretary of the Interior to prescribe general regulations to permit prospecting, development, and use of the mineral resources of the lands acquired under the Act of March 1, 1911, known as the *Weeks Law*, for the best interests of the United States.

2.3. Mineral Leasing Act of February 25, 1920

The Bureau of Land Management, Department of the Interior, is responsible for leasing under this Act. Technical administration of leases and permits is the responsibility of the U.S. Geological Survey. By interdepartmental agreement all applications to lease lands under Forest Service Jurisdiction are referred to the Forest Service for review, recommendation, and special stipulations to protect the surface and surface functions.

2.4. Reorganization Plan No. 3 of 1946

Part IV, Section 402 (60 Stat. 1097, 1099; 5 USC Appendix). This Plan provides that development of mineral deposits in certain lands pursuant to provisions of the *Mineral Resources on Weeks Law Lands Act* of March 4, 1917 (Ch. 179, 39 Stat. 1134, 1150, 16 USC 520) shall be authorized by the Secretary of the Interior only when he is advised by the Secretary of Agriculture that such development will not interfere with the primary purposes for which the land was acquired and only in accordance with such conditions as may be specified by the Secretary of Agriculture in order to protect such purposes.

2.5. Energy Security Act of June 30, 1980

The *Energy Security Act* (P.L. 96-294, 94 Stat. 611; 42 USC 8801 (note), 8854, 8855) directs the Secretary of Agriculture to process applications for leases and permits to explore, drill, and develop resources on National Forest System lands, notwithstanding the current status of the land and resource management

3. ACTS OF AUTHORITY

3.1. Mineral Leasing Act for Acquired Lands of August 7, 1947

The *Mineral Leasing Act* (Ch. 513, 61 Stat. 913; 30 USC 351, 352, 354, 359) provides that all deposits of coal, phosphate, oil, oil shale, gas, sodium, potassium, and sulphur that are owned or may be acquired by the United States and that are within the lands acquired by the United States may be leased by the Secretary of the Interior under the same conditions as contained in the leasing provisions of the mineral leasing laws. No mineral deposit covered by this section shall be leased except with the consent of the head of the executive department, independent establishment, or instrumentality having jurisdiction over the lands containing such deposit, or holding a mortgage or deed of trust secured by such lands that is unsatisfied of record, and subject to such conditions as that official may prescribe to ensure the adequate use of the lands for the primary purposes for which they have been acquired or are being administered.

3.2. The Federal Onshore Oil and Gas Leasing Reform Act of December 22, 1987

The 1987 *Leasing Reform Act* (30 USC 181, et seq.; P.L. 100-203) expanded the authority of the Secretary of Agriculture in the management of oil and gas resources on National Forest System lands and directed the Secretary to issue rules on bonding and reclamation standards. Under the Act, leases for oil and gas on National Forest System lands cannot be issued by the BLM without the approval of the Forest Service. All surface-disturbing activities on National Forest System lands must be approved by the Forest Service before operations commence. The Act also provides for inspections and enforcement of operations once commenced. Regulations implementing this statute were published in the Federal Register by the Forest Service on March 21, 1990 (55 FR 10423, et. seq.). The regulations were codified in 36 CFR 228.100 et. seq.

3.3. Energy Policy Act of 2005

The Energy Policy Act of 2005, P. L. 109-58 mandated the Bureau of Land Management, Department of Interior, and the United States Department of Agriculture Forest Service, to establish joint policies and procedures for managing oil and gas leasing and operational activities on public and National Forest System lands.

4. MANDATES

4.1. Organic Act

The *Organic Act* of June 4, 1897 (16 USC 475) established the system of Forest Reserves, which later became the National Forest System. This act defines and describes the basic purposes for which National Forests (and later, National Grasslands) are to be managed.

The Act provides in part that "... it is not the purpose or intent of these provisions, or of said section, to authorize the inclusion therein of lands more valuable for the mineral therein, or for agricultural purposes, than for forest purposes" (Chpt. 2, Sec. 1, (30 Stat. 34)). Provision is made for regulations allowing free use of timber and stone for bona fide miners and prospectors in 16 USC 477. Authority for regulations providing access for prospecting, locating, and developing mineral resources is found in 16 USC 478.

The General Mining Law of 1872 (30 USC 22-54) preceded the Organic Act and the establishment of the Forest Reserves and National Forests.

4.2. Multiple-Use Sustained-Yield Act of 1960

The *Multiple-Use Sustained-Yield Act* of 1960 (16 USC 528) extended the purposes for which lands of the National Forest System could be managed. It also declared that these lands be managed for multiple uses, rather than for individual uses in individual places. Management of the individual natural resources of the lands is declared to be according to the principle of sustained yield in perpetuity.

This Act provides, in part, that "Nothing herein shall be construed so as to affect the use or administration of the mineral resources of national forest lands ..."

4.3. National Forest Management Act of 1976

This statute (16 USC 1600, et. seq.) and its implementing regulations (36 CFR Part 219) define additional principles for management of the lands and resources of the National Forest System. This Act also directs the Forest Service to create Land and Resource Management Plans for each administrative unit of the National Forest System. The Plans are "to provide for multiple use and sustained yield of goods and services from the National Forest System in a way that maximizes net public benefits in an environmentally sound manner" (36 CFR 219.1(a)). The Act describes required management of renewable resources, but indicates that mineral exploration and development must be considered in the planning and management relating to the renewable resources (36 CFR 219.22).

These authorities, and the discretion of the Forest Supervisor in making these decisions, are conditioned by several other statutes. The basic laws that limit the discretion of the Supervisor to make these decisions are described below.

4.4. National Environmental Policy Act of 1969

This statute (40 USC 4331 et. seq.) and its implementing regulations (40 Part 1500) apply to Federal actions relating to oil and gas leasing. This statute requires the Federal Authorized Officers in the Forest Service and other Federal Agencies to perform an environmental analysis and disclose the effects of their decisions on the quality of the human environment. The law further requires the Federal Officers to identify and describe the significant environmental issues associated with his/her decision and to develop alternatives to his proposed action (including the alternative of no action). Federal Officers must disclose the direct, indirect, and cumulative effects of the decision, and adverse environmental effects that cannot be avoided, the relationship between short-term uses of man's environment and the maintenance of long-term productivity, and any irreversible or irretrievable commitments of resources made by the decision.

4.5. The Clean Air Act of 1970

The *Clean Air Act* (91 Stat. 685; 42 U.S.C. 7401 et seq.) provides that each State is responsible for ensuring achievement and maintenance of air quality standards within its borders so long as such standards are at least as stringent as Federal Standards established by the U.S. Environmental Protection Agency (EPA).

4.6. The Endangered Species Act of 1973

The *Endangered Species Act* (Public Law 93-204; 16 USC 1531, et. seq.), as amended, requires a special protection and management on Federal lands for threatened or endangered species. The U.S. Fish and Wildlife Service (FWS) is responsible for administration of this act. Federal agencies proposing an action or processing an action proposed by a third party which "may affect", in any way, the existence of an identified species must consult with the FWS to determine if, and how, the proposed action will affect those species. Mitigation measures will be developed through the consultation process and are put forth as suggested conservation measures included a formal "FWS Biological Opinion" as to whether or not the proposed action would jeopardize the continuous existence of any officially listed endangered or threatened species.

4.7. Clean Water Act

Clean Water Amendments ("Federal Water Pollution Control Act Amendments of 1972"); Act of October 18, 1972 (P.L. 92-500, 86 Stat 816, as amended; 33 USC 1251, et seq.)-the act puts forth national standards to restore and maintain chemical, physical and biological integrity of the Nation's waters. Upon passage of Environmental Quality Acts and adoption of water quality standards, stage agencies were empowered to enforce water quality standards as long as they are at least as stringent as Federal standards established by the EPA.

4.8. National Historic Preservation Act

The *National Historic Preservation Act* is Public Law 89-665, 80 Stat. 915 (16 USC 470) as amended. Section 106 of the Act requires a Federal agency planning an undertaking to consider the effects of the action on cultural resources eligible to, or listed on, the National Register of Historic Places. Prior to the approval of the undertaking the agency must afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on the undertaking.

4.9. Energy Policy Act of 1992

This Act changed the primary term of competitive leases from five (5) years to ten years.

4.10. Federal Land Policy and Management Act of 1976

This statute (43 USC 1700; et. seq.) and its implementing regulations define principals for management of public lands and their resources. This act directs the Secretary of the Interior to develop, maintain, and, when appropriate, revise Land Use Plans which provide for the use of public lands and guide management on the basis of multiple use and sustained yield unless otherwise specified by law.

4.11. Wilderness Act of 1964

The Wilderness Act of 1964, (16 U.S.C. 1131-1136), specifies congressional policy to secure for the American people an enduring resource of wilderness for the enjoyment of present and future generations. It defines wildernesses as areas untrammeled by people that offer outstanding opportunities for solitude and directs agencies to manage wilderness to preserve natural ecological conditions (section 2320.6). With certain exceptions, the Act prohibits motorized equipment, structures, installations, roads, commercial enterprises, aircraft landings, and mechanical transport. The Act permits mining on valid claims, access to private lands, fire control, insect and disease control, grazing, water resource structures (upon the approval of the President), and visitor use.

4.12. Nevada Wilderness Protection Act of 1989

The Nevada Wilderness Protection Act of 1989 designated certain lands in the Humboldt and Toiyabe National Forests as Wildernesses. Designation included the Currant Mountain, Grant Range and Quinn Canyon Wildernesses that are within the project area. These lands are to be managed as components of the National Wilderness Preservation System in compliance with The Wilderness Act of 1964 enacted September 3, 1964, and amended October 21, 1978 (16 U.S.C. 1131-1136).

4.13. Tax Relief and Health Care Act of 2006: Division C, Title III- White Pine County Conservation, Recreation, and Development

Often referred to as the “White Pine County Lands Bill”, this Act was approved on December 20, 2006. Within the project area, the law established four new Wildernesses and expanded the existing Currant Mountain Wilderness. These designations totaled 129,709 acres. The legislation withdrew these new Wildernesses from mineral leasing (Section 323 [d]).

APPENDIX C:

GEOLOGY, OIL, AND GAS EXPLORATION, DEVELOPMENT AND POTENTIAL

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1. GEOLOGY

The project area is in the Basin and Range physiographic geologic province. The region has had a dynamic geological history. Even though the region is now under extensional tectonic stress, the region has undergone several periods of compressional tectonic stress and periods with inactive coastal margins.

In the early Paleozoic Era, the region was a marginal coastal zone. The sediments were deposited in a geosynclinal environment. A carbonate belt was deposited in what is now eastern Nevada with the detrital coastal deposits to the east and the deep ocean sediments to the west. The rock types consist of shales and limestones. This depositional environment remained up to the beginning of the Devonian Era.

In the middle Paleozoic Era, the region experienced its first compressional event. The Antler Orogeny began in central Nevada. A subduction zone was established to the west and a volcanic island arc was developed with a foreland basin within the project area. A foreland basin environment is where mountainous terrain outcrops in the ocean away from the coast line and a basin is developed where sediments wash into it from both sides where clastic sediments (sand and silt) intermix with limestone type deposits. In this basin, the Pilot shale, Joanna Limestone, Guilmette Formation, Chainman shale and the Diamond Peak Formation were deposited. During the Antler Orogeny, the Roberts Mountain Thrust was developed and it is believed that the coastal sediments and crust were compressed by at least 100 kilometers. The Antler Island Arc system was accreted onto the continental margin by subduction but the actual volcanic terrain has not yet been located. A second island arc system, the Sonomia system, was also accreted onto the continental crust in central Nevada in the late Paleozoic Era.

With the accretion of the Sonomia Island Arc, a subduction zone was established in what is now western Nevada. This subduction marks the beginning of the modern circum-Pacific orogenic system. The Kula Plate was subducted under the continental crust. North America and the accreted Sonomia Island Arc system changed their direction of motion relative to the western ocean floor plate by rotating clockwise. A thermal bulge relating to volcanism occurred along the Sonomia suture zone. Sediments were transported to the north and east of the developed highlands. The volcanism subsided in the Late Triassic Era, and the highlands to the southern end of Nevada subsided and was again below sea level.

With the onset of the Jurassic Era, events to the east set the stage of the geography we see today. The Atlantic sea floor spreading center was developed and the subduction to the west intensified. These events were in relationship to the break up of the supercontinent Pangea. During the early stages of the break up, sediments were deposited in the interior regions of North America, Great Basin and the Colorado Plateau. The corresponding Rocky Mountain uplift event is known as the Cordilleran Orogeny. Several major thrust belts were associated with this subduction zone. The major thrust belt in Nevada is the Sevier belt. The crustal shortening is estimated to be about 100 kilometers. The volcanic activity extended between the Sierras and the Rocky Mountains in step with the subduction rate of the oceanic plate.

From the middle Cenozoic Era to the present time extensional forces developed within the Basin and Range. The high angle fault controlled mountain ranges and intervening valleys are the

result of the regional extensional forces. Volcanic activity increased with the extensional forces and the accompanying thinning of the continental crust. Valley fill within the area contains the erosional remnants of the mountain blocks.

2. OIL AND GAS PLAYS

United States Geologic survey (USGS) open file report, 88-450-H, Eastern Great Basin and Snake River Downwarp, Geology and Petroleum Resources was written for developing oil and gas potential ratings in Nevada. The report develops two oil and gas plays for Eastern Nevada. The project area overlaps in each play.

The two oil and gas plays are described as an Unconformity play and an upper Paleozoic play. The unconformity play is structural and sealed by weathered Tertiary volcanics or valley fill. The source rocks are the Mississippian aged Chainman Shale and Pilot Shale of the Sheep Pass Formation. These are the types of Oil fields now producing in Railroad Valley including the Grant Canyon Field. The Upper Paleozoic play is a possible stratigraphic trap between the Diamond Peak Formation and the Chainman Shale with the confining seal layer being shale. The main concern with this type of trap is that the tectonic movements of the Basin and Range may have disturbed these seals. This type of trap is producing oil in the Blackburn field in Pine Valley, Nevada. Chainman shale is the reported source rock. The report also states a Pre-Devonian play could be present but the Basin and Range tectonic events may have destroyed any traps or seals.

The mountain regions of the state have not been drilled to the extent the valley areas have. However, there has been extensive interest in an overthrust type of trap in the eastern edge of the project area. Several large development contracts have been negotiated for this area on Bureau of Land Management (BLM) managed lands. The information developed from these contracts has shown some good basis for the overthrust theory. The Antler and Sevier Thrusts are two events that have occurred in the geologic past. There are several known thrust belt areas in the state that could contribute to possible oil and gas development.

2.1. Oil Field Development History Adjacent to Project Area

The Railroad Valley fields are adjacent to the project area on the west side of the Grant and Quinn Canyon Ranges. There is no current production in the project area. The first production oil well was drilled in Railroad Valley in 1954. Since then, 155 wells have been drilled in an area covering approximately 450 square miles. The number of wells drilled in Railroad Valley per year has varied from zero to 24. Drilling trends have also varied greatly. No drilling has occurred during four consecutive year periods, and 42 wells have been drilled during three-year periods when recent discoveries would peak interest for several years. While 10 wells were drilled in 1954 through 1955, only 10 wells were drilled during the period of 1955 through 1964. Twenty-four dry wells were then drilled during the next four years. Only three wells were drilled from 1969 through 1975. Since 1977, over 250 wells have been drilled. This indicates that interest from industry continues to expand in Railroad Valley.

Eighty-four wells drilled in Railroad Valley were completed as producers, and eight were converted to injection wells. Since Railroad Valley remains a wildcat area, much of the drilling

that occurred is associated with exploration units. Forty-five exploration units have been approved in Railroad Valley, averaging 14,000 acres in size. As many as 14 units have been approved in a year.

Ten producing fields have been discovered in Railroad Valley since the 1950's. Eagle Springs began production in 1954 when the first producing oil well in the State, Shell Eagle Springs Unit No. 1-35, was completed. This was the second well drilled in Railroad Valley. The second discovery did not occur until 1976 when Northwest Exploration Trap Spring No. 1 was completed. One hundred and forty-five wells were drilled in the State during the years between the two discoveries. Since the Trap Spring discovery, a new field has been discovered every two to three years between 1976 and 1998. The Currant field still has a well with intermittent production. Production from the Kate Spring field has been intermittent until recently where production has increased by the completion of a fourth well in the field. The number of production wells per field ranges from one to forty, which are drill on 10, 40 or 160 acre spacing depending on reservoir depth. Field production ranges from five to 700 barrels of oil per day (BOPD). Individual field statistics in 2004 are given in the following table.

Table C-1: Producing Oil Fields in Railroad Valley - 2004

Field Name	Production Start Date	Production BOPY	Production Acres
Eagle Springs	1954	45,176	640
Trap Springs	1976	181,937	2,080
Currant	1978	9	40
Bacon Flat	1981	10,612	160
Grant Canyon	1983	73,8790	240
Kate Spring	1986	45,656	640
Duckwater	1990	200	unknown
San Spring	1993	unknown	unknown
Ghost Ranch	1996	36,423	unknown
San Dune	1998	13,124	unknown

The nature of the resources in Railroad Valley has led to exploration drilling following a very dispersed pattern. Of the 160 wells drilled, 96 have been drilled outside of field areas. The spacing of these wells ranges from one per square mile to one per 30 square miles. The extremely complex geologic structure of the area has limited the well success rate to approximately 28%. Even within the defined fields, the success rate is only 60%. However, once a discovery is made, localized development activity may be very intense since the reservoirs are typically small but may be extremely prolific. Each new discovery spurs additional drilling activity throughout the area.

Railroad Valley has ten producing oil fields with combined annual production ranging from over 3 million to 400,000 barrels of oil during the past twenty years. Usually there is a rotation in the mix of production as one field is developed and other fields' production declines, or a new operator (with an infusion of capital) more aggressively promote field development from an existing field. Currently the Trap Springs field produces nearly 40% of the production in Railroad Valley. In the 1980's and early 1990's, the Grant Canyon field was the largest producer,

accounting for 66% of the production from Railroad Valley. Estimates of recoverable reserves from each producing field vary from four to twenty-one million barrels. After 46 years, the Eagle Springs field has reached 95% of estimated reserves, and still is the fourth largest producing field.

To support the exploration and production that has occurred in Railroad Valley, surface use facilities including drill pads, roads, pipelines, tank batteries, and one small refinery, have been constructed. Because most wells in Railroad Valley are relatively shallow (around 5500 feet), the typical drill pad occupies only 1.5 acres. The largest tank battery, which is located in the Grant Canyon field, occupies approximately ten acres. Production from this field made the citing of a small refinery in Railroad Valley feasible. The refinery occupies approximately 20 acres. Delivery trucks make seven round trips a day from the refinery to the surrounding tank batteries in Railroad Valley.

Higher oil prices may invite more field development, as well as wildcat exploration wells. Oil prices remain cyclical and will directly affect the aggressiveness of oilfield developers. The prices paid in Railroad Valley for produced oil varied in the range of \$6 to \$20 during the 1990's and has recently surpassed \$50 dollars a barrel.

3. SUMMARY OF OIL AND GAS EXPLORATION AND DEVELOPMENT WORK

Exploration for oil and gas has increased with the increase of oil and gas prices. The BLM Egan Resource Area to the east of the project area has continued to see this increase of exploration work. A total of 108 exploration wildcat wells have been drilled in this resource area. Of these, 47 had oil shows, eight had oil and gas shows, and five had gas shows. Two wildcat exploration wells were drilled in the northeast part of the White Pine Range within the project area in the early 1990's. A show of oil and gas was reported for these two wells. In the past five years, 38 geophysical exploration surveys have been completed on surrounding BLM and private lands to the east and west of the project area. These exploration surveys were mainly seismic lines, however, other geophysical surveys included gravity and induced polarization techniques. There is one producing field to the north of the project area and 12 producing fields are operating west of the area in Railroad Valley and to the northwest in Pine Valley.

3.1. Oil and Gas Potential

The oil and gas potential for the project is moderate in the Grant Range and most of the White Pine Range. It is low for the Quinn Canyon Range, northwest part of the Grant Range where the intrusive Troy Canyon Pluton outcrops, and northwest part of the White Pine Range where the intrusive Seligman Canyon Pluton outcrops. This information was generated from publications, reports and other forms of information listed in the references below. It is based on the presence of viable source rocks and potential structural traps in the area and proximity to existing fields and exploration data.

The definitions for mineral potential are the following:

Moderate Potential - Interpretation of data indicates the environment is favorable for the occurrence of undiscovered oil and gas resources, however one of the geologic controls necessary for the accumulation of oil or gas may be absent.

Low Potential - The geologic, geochemical, and geophysical characteristics do not indicate a favorable environment for the accumulation of oil and gas resources. Evidence exists that one of the geologic controls necessary for the accumulation of oil or gas is absent.

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APPENDIX D: STANDARD OPERATING PROCEDURES (SOPs)

This appendix has been deleted from the Final Environmental Impact Statement. Relevant material was incorporated into Appendix E.

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APPENDIX E:

OIL AND GAS EXPLORATION AND DEVELOPMENT

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1. INTRODUCTION

Oil and gas exploration and production are governed by existing laws and regulations. There is an umbrella of national laws that must be enforced, including the Clean Air Act, Clean Water Act, Endangered Species Act, Migratory Bird Treaty Act, Federal Land Policy and Management Act, National Environmental Protection Act, and Archaeological Resource Protection Act. More regionally, the Forest Plan applies to all activities. From the Code of Federal Regulations, 43 Title 3100 series, a description is prescribed for oil and gas leasing, bonding, drilling and production. Even local codes are enforced when trash and human waste are considered for the surface use plan.

Once an oil and gas lease is issued, the lessee or operator may enter upon the leasehold to conduct oil and gas operations unless otherwise limited by special stipulations. The following depicts what can be expected to occur and, therefore, assumed will occur for the purposes of this analysis when oil and gas is discovered and development of a lease is undertaken. It also is assumed that the technology of oil and gas exploration and development will not change significantly during the life of this document. This section is an integral part of the assumptions made in Chapter 2.

Successful oil and gas exploration and development generally progresses through five basic operational phases. These include (1) preliminary investigation (includes geophysical exploration), (2) exploratory drilling, (3) development, (4) production, and (5) abandonment. Several operational phases can occur in the same area at the same time. One company may drill an exploratory well on a lease while nearby another company conducts preliminary investigations. However, if only one company is conducting operations in an area, normally only one phase of the operation will take place at a time. A lapse of several months or perhaps years may occur between the preliminary investigation and exploratory drilling phases. A lapse of several weeks or months also may occur between the exploratory drilling and development phases. The development and production phases may occur simultaneously, especially if a large field has been discovered. On an average, only 15% of the wildcat (exploratory) wells drilled in the United States are successful.

It may take several years to determine whether an exploratory well is a financial success. If it is a success, the operations progress through the three remaining phases over a time span ranging up to 50 years.

The lapsed time between the production and abandonment phases of a field may be 15-20 years. If geophysical exploration and/or exploratory drilling are unsuccessful in the discovery of a commercial deposit of oil and gas, operations are terminated and abandonment is initiated. The operation also may go directly from development to abandonment if one or more of the development wells is unsuccessful.

2. PRELIMINARY INVESTIGATIONS (PHASE 1) _____

Exploration methods such as remote sensing and the mapping of rock outcrops and seeps can obtain indications of the presence of oil and gas. In many cases indirect methods, such as

seismic, gravity, and magnetic surveys are used to delineate subsurface features that may contain oil and gas.

2.1. Permitting Process

Geophysical exploration (seismic reflection surveys) on National Forest System lands is authorized under a prospecting permit issued by the Forest Service. However, the lessee under the terms of the oil and gas lease may conduct geophysical operations within the leasehold without a Forest Service prospecting permit. The Forest Service prior to being approved or authorized examines proposals for geophysical operations on and off an oil and gas lease. Most casual-use investigation methods, such as geological, gravity, geomagnetic, and geochemical surveys, do not require a permit since no surface disturbance occurs and only a "casual" presence on the land surface is required to conduct the operations.

In order to secure a permit for operations on National Forest System lands, the geophysical operator is required to file an application for a prospecting permit either in person or by mail. The application must describe the proposed activities in detail and include a map showing access routes and location of exploration activities. Upon receipt of the application, the Forest Service reviews the proposed activities to determine the stipulations necessary to protect surface uses and resources. After the Forest Service reviews the application, a permit is prepared. The operator is sent the prospecting permit indicating the stipulations, fee to be paid (if applicable), and amount of bond required. The operator must sign and return the permit with fee and bond required prior to receiving a permit. A permit is not required for casual-use investigations.

The operator must receive approval of a prospecting permit prior to initiating operations outside a lease. The operator must also notify the Forest Service of the scheduled entry onto the land, must comply with all stipulations, and receive prior approval of any changes in the original plans. A prework conference and a cultural resources survey may be required prior to undertaking surface disturbing activities. The Forest Service conducts compliance inspections during exploration operations to ensure compliance with the permit and to prevent unnecessary damage to the surface resources.

The geophysical operator is required to notify the Forest Service when operations are completed. The Forest Service conducts a final inspection prior to approval of termination of the permit and release of the bond.

2.2. Geologic and Remote Investigations (Surveys)

Geological Surveys Geological surveys normally are a casual use. Rock outcrops and topography are examined to determine the structural attitude and age of surface formation and surface maps are prepared. In some areas, sufficient information may be obtained to enable the geologist to recommend a drilling location without conducting additional exploration work.

Geochemical and Soil-gas Surveys Geochemical and soil-gas surveys involve casual use of the land. In geochemical surveys, the chemical contents of water, soil, or vegetative samples are analyzed for the minute presence of oil or gas.

Gravity Surveys Gravitational prospecting is a casual use to detect microvariations in gravity caused by the differences in the density of various rock types. The instrument used for gravity surveys is a small portable device called a gravimeter, which can be carried by an individual. There is little surface disturbance associated with gravity prospecting except that which may be caused by off-road vehicle (ORV) use to transport equipment.

Geomagnetic Surveys Magnetic prospecting is used to a limited extent in oil and gas exploration. Magnetic surveyors use an instrument called a magnetometer to detect small magnetic anomalies in the earth's crust. Most magnetic surveys are conducted from the air by suspending a magnetometer under an airplane. This is a casual use. There is no surface disturbance from magnetic survey operations.

2.3. Seismic Reflection Surveys (Geophysical Exploration)

Seismic prospecting is the most common indirect method used for locating subsurface structures that may contain oil and gas. Shock waves are induced into the earth using one of several methods. These waves travel downward and outward encountering various strata, each having a different seismic velocity. Sensing devices called geophones are placed on the surface to detect these reflections. The geophones are connected to a data recorder, which stores the data. The time required for the shock waves to travel from the seismic energy source down to a given reflector (a change in rock strata) and back to the geophone can be correlated to the depth of the reflector. At the present time, vibriosis and drilling/explosive are the two most commonly used geophysical exploration methods.

Vibriosis Surveys - The thumper and vibrator methods pound or vibrate the earth to create the shock wave. Usually four large trucks, each equipped with vibrator pads (about four feet square), are used. The pads are lowered to the ground and vibrators on all trucks are turned on simultaneously. Information is recorded, the trucks are moved forward a short distance, and the process is repeated. Except where an access trail may be constructed or cross-country travel is necessary, surface disturbance is usually minimal since little surface area or disturbance is required to operate the equipment at each test site.

Drilling/Explosives - The drilling method uses truck-mounted drills that drill small-diameter holes to depths of 100 to 200 feet. Four to twelve holes are drilled per mile of line. Usually, a 50-pound charge of explosives is placed in the hole, covered, and detonated. The explosion sends energy waves that are reflected back to the surface from subsurface rock layers. The holes are drilled along a line that can be miles in length. In rugged topography, inaccessible to wheeled vehicles, a portable drill may be transported by helicopter. A typical drilling seismic operation may use 10 to 15 men operating five to seven trucks. Under normal conditions, three to five miles of line can be surveyed each day using the explosive method. The vehicles used for a drilling program include several heavy truck-mounted drill rigs, water trucks, a computer recording truck, and several light pickups for the surveyors, shot-hole crew, geophone crew, permit man, and party chief. Public roads and existing private roads and trails are used. Off-road, cross-country travel also is necessary. Motor graders and/or dozers may be required to provide access to remote areas. Several trips a day are made along a seismograph line, which usually establishes a well defined two-track trail. Drilling water, when needed, is usually obtained locally.

Surface Charges - Another portable technique eliminates the drill holes by placing the charges on wooden sticks, or lath, three feet above the ground. Charges used are either 2.5 or 5 pounds. Usually, ten charges in a line are detonated at once. In remote areas, a series of short seismic lines may be used to determine the regional dip and strike of subsurface formations. Seismic lines then may be aligned in relationship to the regional structures to facilitate more accurate seismic data and interpretations. The seismic sensors and energy source are located along lines on a one- to two-mile grid. Although alignment may be critical, spacing of the lines can often be changed 0.25 mile on a one-mile grid before the investigation is significantly affected.

Primacord - Another seismic technique involves the use of explosive cord. The cord is buried in a 2.5-foot-deep furrow, plowed by a specially designed mechanical plow mounted on a tractor. Multiple sets of cord, often in a pattern, are buried at the same time. This method offers efficiency advantages over the shot-hole seismic method in that it is faster, less costly, and the quality of the data is often improved. However, surface disturbance may be considerably greater than with the shot hole seismic method.

2.4. Post-Lease Preliminary Investigations

If the preliminary investigations indicate that an oil or gas trap may exist in an area, the company may secure leases either directly through the Federal leasing system or from existing leaseholders through assignment (lease is purchased and ownership is assigned). Additional preliminary investigations may be carried out after a lease is acquired. Post-leasing investigations may include airborne and surface operations similar to those of the preleasing phase. The lessee may intensify the seismic studies by extending lines on 0.5 mile grids and laying out a criss-cross pattern of lines tying to the previous seismic lines. Other preliminary investigations may also be initiated prior to drilling.

3. EXPLORATORY DRILLING (PHASE 2)

3.1. Permitting Process

Where preliminary investigations are favorable and information warrants further exploration, exploratory drilling is conducted. More precise data on the geologic structure may be obtained by stratigraphic tests using shallow holes. The presence of suspected oil and gas deposits may be confirmed by exploratory (wildcat) drilling of deep holes. Exploratory drilling on National Forest System lands is authorized only by a Federal oil and gas lease, but cannot be conducted unless a Surface Use Plan of Operations (SUPO), drilling program, and Application for Permit to Drill (APD) are approved.

Proposed construction and other operations that involve surface disturbance conducted under the terms of a lease must be approved by the Forest Service before such activities are conducted. Proposed drilling, development, and production operations must be approved by the BLM. Operations must be approved and conducted in accordance with (1) lease terms; (2) 43 CFR 3160; (3) 36 CFR 228, Subpart E; (4) Onshore Oil and Gas Order No. 1; (5) other onshore oil and gas orders; (6) applicable Notices to Lessees (NTLs); (7) conditions of approval; and (8) subsequent orders of the authorized officers of the BLM and Forest Service.

No drilling operations or related surface disturbance can be conducted without an approved APD. An APD includes a drilling plan which consists of (1) a surface use program and (2) a drilling program. The detailed information required to be submitted under each program is identified in Onshore Oil and Gas Order No. 1 and 36 CFR 228, Subpart E. An onsite inspection of the proposed wellsite, road location, and other areas of proposed surface use is conducted prior to approval. The inspection team includes BLM and Forest Service representatives, the lessee or operator, and operator's principal drilling and construction contractors and archaeologist. The purpose of the onsite inspection is to identify problems and potential environmental impacts associated with the proposal and the methods for mitigating those impacts. These may include making adjustments to the proposed well site and road locations, identifying the construction methods to be employed, and identifying reclamation standards for the lands after drilling.

The Forest Service is responsible for conducting the environmental analysis, preparing the documentation, and providing mitigation measures to protect surface resource values on National Forest System lands for APD approvals. The BLM is responsible for approval of the drilling program, protection of groundwater resources, and final approval of the APD.

Other proposals to occupy the surface that involve surface disturbance, but are not associated with drilling a well, must also receive advance approval under the procedures described above.

There are two options available to the oil and gas operator when applying for approval of an APD. These are (1) the Notice of Staking (NOS) option and (2) the APD option.

NOS Option - The NOS consists of an outline of what the company intends to do including a location map and sketched site plan. The NOS document is reviewed to identify any conflicts with known resource values and also used for the onsite inspection and to provide the preliminary data to assess what items are needed to complete an acceptable surface use plan and drilling program.

Application for Permit to Drill (APD) Option - The operator or lessee may submit a completed APD, in lieu of the NOS, to the BLM. A field inspection is held by the BLM with the operator and the Forest Service. The drilling plan may be revised or site-specific mitigation added as conditions of approval to the APD for protection of surface and/or subsurface resource values in the vicinity of the proposed activity.

Special-use permits are issued by the Forest Service for facilities, tank batteries, pipelines, truck depots, powerlines, and access roads that occupy National Forest System lands outside the lease or unit boundary whether constructed by the lessee/operator or a third party.

3.2. Oil and Gas Exploratory Units

Surface use in an oil or gas prospect may be affected by unitization (consolidation) of the leaseholds. In areas of Federally-owned minerals, an exploratory unit may be formed before a wildcat exploratory well is drilled. The boundary of the unit is based on geologic data. The leaseholders of the unit can enter into an agreement to explore and/or develop and operate a unit,

without regard to separate lease ownerships (43 CFR 3180). Costs and benefits of the exploration are allocated according to agreed-upon terms.

3.2.1. Stratigraphic Tests

Stratigraphic test holes are drilled 100- to 500-feet deep to locate geologic indicators. The holes are usually drilled with truck-mounted equipment and disturb a relatively small area. Casing is needed for stratigraphic holes in areas of shallow high-pressure zones. The roads and trails constructed for access to the test sites are temporary and involve minimal construction. Only one to three days are required to drill each hole. The drillsite occupies an area approximately 30 feet by 30 feet and is sometimes placed in the center of a new or existing trail.

3.2.2. Wildcat Wells

Wildcat wells are deeper tests, require larger drilling rigs with support facilities, and may disturb a larger surface area than stratigraphic tests. Construction of access roads, drill pads, reserve pits, and, in some cases, worker camps are required to conduct exploratory drilling operations.

The well site is selected on the basis of prior surface investigations, seismic surveys, data from other wells that have been drilled in the area, topography, accessibility and requirements of lease stipulations and protection of surface resources.

3.3. Surface Requirements and Construction

Upon approval of the APD the construction equipment may enter the leasehold. The types of construction equipment used include dozers (track-mounted and rubber-tired), scrapers, and motor-graders. Moving equipment to the construction site requires several semitrucks.

Prior to initiating surface disturbing operations, the operator notifies the Bureau's inspector, and NDOM. The Bureau inspector is on call 24 hours a day, employs an answering machine, and cell phone to remain in constant contact with all agencies, offices, as well as the engineer in each of the NDOM and Bureau permitting offices. The Bureau inspector maintains daily conversations with NDOM to ensure complete coverage of inspection needs. Both agencies coordinate the witnessing of the operations. Once the drilling begins, inspections are arranged to witness cementing of downhole casing, blowout prevention equipment testing, and any plugging operations. Any changes to the permitted operations are requested by a Sundry Notice submitted to both inspecting agencies. Final reclamation of the well site is also conducted with the approval of the Bureau. The bond is not returned to the operator until all of the conditions of approval for the drilling permit have been met to the satisfaction of the authorized officer and surface management agency.

Construction usually begins with the access road to the well site. Generally, the shortest feasible route consistent with the topography is selected to reduce the haul distance and construction costs. In some cases, potential environmental impacts or existing transportation plans dictate a longer route. In rough terrain, the type of construction is sidecasting where the material taken from the cut portion of the road is used to construct the fill portion. Roads are usually constructed to a 14-foot-wide travel surface (in relatively level terrain). Road surfacing may be required because of adverse soil conditions, steepness of grade, and moisture conditions.

Well sites are selected and constructed giving consideration to the amount of level surface required for safe assembly and operation of a drilling rig. The amount of area required varies with the drilling depth and the type of rig used and may vary between two and four acres in size. The substructure of the drilling derrick must be located on solid ground. Settling of uncompacted fill material under the drill rig has caused the substructure and mast to lean and even fall. In addition to the drilling platform, a reserve pit is constructed to accommodate spent drilling fluids and cuttings resulting from drilling. The pit is usually square or oblong, but may be constructed in another shape to accommodate topography.

All soil material suitable for plant growth is first removed from areas to be disturbed and stockpiled in a designated area. Well sites located on flat terrain usually require little more than removing the topsoil material and vegetation. Well sites on ridge tops and hillsides are constructed by cutting and filling portions of the location to provide a level area (drill pad) that will accommodate the drill rig, ancillary facilities, and drilling operations. The majority of the excess cut material is stockpiled in an area that will allow easy recovery for reclamation. Extra cut material may need to be stockpiled to avoid casting the excess material down hillsides and drainages where it cannot be recovered for rehabilitation.

Depending on the relation of the drillsite to natural drainages, it may be necessary to construct water bars or diversions. The size of the area disturbed for construction and the potential for successful revegetation often depends on the steepness of the slope.

The drilling rig (including its attendant facilities such as pumps, mud tanks, generators, pipe racks, tool house, etc.) is located on the drill pad. Other facilities such as storage tanks for water and fuel may be located on or near the drill pad.

3.4. Drilling Operations

Usually drilling activities begin within a week or two after the well site and access road have been constructed. The drilling rig and associated equipment are moved to the site and erected. Moving a drilling rig requires 30 to 40 truckloads of equipment over public highways and may also involve private roads.

The most commonly used well drilling equipment is the rotary rig, which consists of (1) a power system, normally diesel-engine-powered electric generators; (2) a hoisting system, which consists of a derrick ("mast"), crown block, and traveling block used to lift and lower the drill; and (3) the rotary system, which consists of the drill bit attached to a length of tubular high tensile steel "drill-stem pipe" (collectively called the "drill string") which is turned by a rotary table; and (4) the mud circulating system consisting of mud tanks, mud pumps, and reserve pit.

Depending on the height of the substructures, the mast may rise to over 160 feet above the ground surface and is the most visible and noticeable feature of a drill rig. The start of drilling is commonly referred to as "spudding". The actual drilling is accomplished by passing the drill string through the rotary table, which turns the drill string and bit, which in turn performs the actual drilling. The weight of the drill string provides downward pressure on the drill bit, which chips and pulverizes the rock as it rotates in the bottom of the hole. By continually adding more drill-stem pipe to the drill string, the hole is steadily deepened.

At the selected drilling site, a square or rectangular pit is dug. This pit is called a “cellar.” The cellar will later provide additional work space beneath the rig floor after it is constructed on a steel frame substructure which will be built directly over the newly prepared cellar. Then a light truck-mounted rig is usually brought in and used to “spud in” or begin the main hole (well bore) in the approximate center of the completed cellar. This large diameter hole is called the “conductor hole”

After the conductor hole has been prepared to a depth of from 20-100 feet the hole is lined with a steel pipe called “conductor pipe.” This pipe prevents surface cave-ins and washouts of the well bore during the initial drilling of the surface hole.

The next stage is to drill the surface hole. The surface hole is the relatively large diameter well bore that drilled and located from the surface to a depth to protect environmental concerns. On completion of the surface hole, surface “casing” is run into the well bore and cemented to surface. The main purpose for surface casing is to:

1. Control caving and washing out of poorly consolidated surface beds
2. Furnish a means of handling the return flow of drilling mud
3. Protect fresh water sands from possible contamination by drilling mud, or oil, gas, and/or salt water from lower zones.
4. Allow attachment of the blowout preventors.

After the surface casing is in place, a series of blowout preventer (BOP) valves are attached to the well. The valves close down the well in the event the drill bit penetrates rock formations exhibiting extreme pressure zones that could cause unexpected changes in pressure and a well blowout. Special attention is given to the prevention of well blowouts and most of the equipment used to support the actual drilling operations is for controlling excess pressure that may be encountered.

Blowouts are extremely dangerous and may result in uncontrolled situation. It is usually difficult and expensive to bring a well back under control. Blowout prevention equipment is tested and inspected by both the rig personnel and the BLM. The drill rig crew must be trained in safety and blowout prevention.

Drilling is resumed after installation of casing and the BOP using a smaller bit. After the borehole has penetrated all of the surface formations, which may contain fresh water, the bit and drill string are hoisted out of the well and another length of pipe (surface casing) is lowered into the borehole and cemented in place. The depth of the conductor pipe is an important part of blowout prevention. The casing also protects the useable quality water strata (aquifers) from being contaminated by the drilling mud.

Drilling mud (fluid) is circulated through the drill pipe and bit to the bottom of the hole, then up the bore of the well, across a screen that separates the cuttings, and into holding tanks from which it is pumped back into the well. The mud is maintained at a specific weight and thickness to cool the drill bit, lubricate the drill string, seal porous rock zones, prevent blowout or loss of

drilling fluid, and transport the cuttings resulting from the drilling to the surface for disposal. Various additives are used to maintain the drill mud at the desired viscosities and weights. Some additives that may be used are caustic, toxic, or acidic. The spent drilling mud and rock chips are disposed of in the reserve pit.

Water for drilling is hauled by truck to the rig storage tanks or transported by surface pipeline. Water sources are usually wells, or reservoirs. Water supply wells are drilled on or close to the drill site. The operator must obtain a permit from the State for the use of surface or subsurface water for drilling. When the Forest Service holds the water permits for surface water (stock ponds), it must also approve such use. Water is continually being transported to the well site during drilling operations. Although it will vary significantly from well to well, approximately 20,000 barrels or up to 850,000 gallons of water may be required to drill an oil or gas well to the depth of 9,000 feet. If water is hauled by truck, a significant amount of traffic to and from the drillsite will be generated by water hauling. More water is required if the underground rocks are fractured and drilling fluids are lost into the formation (lost circulation zone). Uncontrollable loss of drilling fluids may cause drilling to be terminated.

In some areas where drilling must penetrate clay or shale layers, oil-base drilling muds are often used instead of water-base muds after the surface casing has been installed and cemented. The oil-base muds prevent the clays or shales from swelling and caving into the borehole, which can result in the swelling of the borehole making it impossible to pull the bit out of the hole.

As the drilling proceeds, additional casings of telescoping concentrically smaller diameter are lowered into the well and cemented in place until the final depth (target zone) is reached. During the drilling process, the drill string must be pulled from the well periodically to change the drill bit, install casing, or remove core samples from the wellbore. Core samples are analyzed to determine the type of rocks penetrated and their porosity, permeability, chemical properties, and hydrocarbon content.

Drilling operations continue 24 hours a day and seven days a week. The crews usually work three eight-hour shifts or two 12-hour shifts a day. The greatest amount of human, vehicular, and equipment activity and accompanying noise, etc., occurs during construction and drilling activities. A significant amount of traffic is generated by trucks hauling equipment and water, service companies delivering supplies and equipment and performing specialized work on the drill, drilling crew shift changes, well treatment, and testing equipment, etc. There is a high level of human activity and use of heavy construction and drilling equipment during drilling operations, which is accompanied by considerable noise and highly visible activity.

Upon completion of the drilling, the well is "logged" and tested to obtain information about the rock formation and production of fluids. After completion of the tests the drill rig and other equipment are removed. If oil or gas is not discovered in commercial quantities, the well is considered dry. The operator must comply with State and Federal procedures for plugging a dry hole.

3.4.1. Directional Drilling

Directional drilling may be used where the drill site cannot be placed directly over the reservoir, as might be the case where a river or mountain is involved, where no surface occupancy is permitted on the leasehold, or where land use restrictions require centrally located drillsites.

There are limits both to (1) the degree that the wellbore can be deviated from the vertical and (2) the horizontal distance the well can be drilled from the well site to the target zone. It is not possible to drill directionally from outside an area where surface occupancy is denied and reach a target zone at a horizontal distance of more than one or two miles from the drill site. The limit of horizontal distance also is affected by depth of the target zone, characteristics of the rock formation to be penetrated, and the additional costs of directional drilling. These factors all are considered before applying this technology.

3.5. Oil and Gas Discovery

At the completion of drilling, the well is evaluated to determine if hydrocarbons can be commercially produced. A "drill-stem test" is conducted to directly measure the fluid content (water, oil, or gas) of the formation and the amount of flow and shut-in pressure of the well. The well is logged by measuring the electric resistivity that provides information as to the porosity of the rock, the kind of fluids present, and fluid saturation level of the rocks. These physical characteristics of the rock formations and associated fluids are measured and recorded. If it is determined, based on the tests, that the well can be economically developed for production, the well is readied for production, and connected to a gathering system (see Field Development (Phase 3) and Production (Phase 4)).

4. PHASE 3 – FIELD DEVELOPMENT

The completion of a wildcat well as a commercial producer marks the beginning of the development of an oil and gas field.

4.1 Approval of Field Development Plans

A Field Development Plan consists of a coordinated collection of site-specific drilling and surface use proposals for individual wells as required by Onshore Oil and Gas Order No. 1. The lessee/operator is required to submit the plan when sufficient information is available to project a reasonably foreseeable development of the field. Sufficient information may not be available until one or more confirmation wells have been drilled to delineate the characteristics of the reservoir. The limits of a field located on a structural trap can be determined more easily than a stratigraphic field based on the information obtained from drilled wells and geophysical data. The proposed field development is subject to environmental analysis prior to approval or rejection of the APD.

The surface plan includes information on existing roads, the proposed location of the access roads, the proposed and existing wells, and the tank battery, camps, and airstrips; the proposed location and type of water supply; the proposed waste disposal methods; plans for reclamation of the surface; and other information deemed necessary.

The subsurface information required to be submitted includes (a) occurrence and anticipated depths of fresh water aquifers, (b) expected depths of possible oil or gas productive zones above or below the zone already discovered, (c) other mineral-bearing formations, (d) the potential for entering highly permeable formations in which the drilling mud might be lost, (e) the anticipated pressures in the formations to be drilled, and (f) the potential for encountering other geologic conditions that could cause drilling problems. This information is obtained to determine whether the proposed drilling program is adequate, and to ensure the drilling mud, pressure control, casing, cementing, testing, well logging, and completion programs adequately protect the surface and subsurface environments, protect other subsurface resources, and provide safe working conditions.

4.1.1. Well-Spacing Pattern

Before development of an oil and gas field begins, a well-spacing pattern is established to allot a spacing unit for each well that will be drilled in the discovery area. Oil well-spacing patterns in the United States range from 2.5 acres per well to 640 acres per well. Spacing units established for oil production are usually closer than gas well spacings and are generally in multiples of 40 (40, 80, 160, 320, 640 acres per well). Gas well-spacing patterns in the United States range from 40 to 1,440 acres per well. Most spacing patterns established at the present time for production of gas are 160, 320, or 640 acres per well.

The well-spacing pattern established for an oil and gas field is the primary factor that determines the amount and intensity of human presence and associated activity during the development and operation of an oil and gas field and the amount of surface disturbance and land area required to accommodate surface facilities. The wider the well-spacing pattern, the lower the intensity and concentration of human activity and the less overall surface disturbance occurs within the oil and gas field.

4.1.2. Unitization

Surface use in an oil and gas field is affected by unitization (consolidation of leases) of the leaseholds. In areas involving Federal lands an exploratory unit is formed pursuant to 43 CFR Subpart 3180 through Subpart 3186. The area enclosed within an exploratory unit is based on available geologic data.

A unit agreement provides for (a) development and operation of the field as a single, consolidated unit without regard to separate lease ownerships; and (b) the allocation of costs and benefits according to terms of the agreement. "Exploratory units" also are formed to share the cost of drilling exploratory wells to test geologic structures. Unit agreements involving Federal leases require BLM approval.

Leases that are committed to a producing unit are considered producing leases and will not terminate as long as production continues within the unit. As the limits of the productive area are defined by additional drilling, some leases may be dropped from the unit. If a lease is dropped from a unit, the term of the lease may be extended for a period of two years if less than two years remain in the primary term of the lease.

Field development under a unit agreement reduces the surface use requirements because all wells within the unit boundaries are operated as though they are located on a single lease.

Development and operations of the field are planned and conducted by a single unit operator and, therefore, duplication of field processing equipment and facilities is minimized. Oil or gas field development under a unitization plan also may involve a wider well-spacing pattern and fewer wells than a field developed on a lease by lease basis.

4.1.3. Drilling Procedures

The drilling of development wells is essentially the same as the drilling of a wildcat well. Roads and other facilities are planned and constructed for long-term use.

4.1.4. Surface Use Requirements

Surface uses associated with oil and gas field development wells include access roads, well sites, flowlines, storage tank batteries, and facilities to separate oil, gas, and water. In remote locations, worker camps may be required. Access roads are planned, located, and constructed for long-term use as opposed to roads built for short-term use to drill wildcat wells.

4.1.5. Surface Use and Construction Standards

The minimum standards for design, construction, and oil and gas operations are set forth in the "Surface Operating Standards for Oil and Gas Exploration and Development, Third Edition - U. S. Forest Service and Bureau of Land Management." The publication prescribes the minimum operating standards for oil and gas operations on Federal lands. The objective of the standards is to minimize surface disturbance, effects on other resources and retain the reclamation potential of the disturbed area. Additional site-specific construction and design standards may be required depending on the proposed activities and conditions encountered at the construction site.

The locations for well sites, tank batteries, reserve pits, pumping stations, roads, and pipelines are selected to minimize to the extent possible the long-term impacts to other resources and disruption of other land uses. Ideal locations for oil and gas activities are seldom available and avoidance of damage to surface resources is not always possible. Well sites are constrained by the geologic target to be drilled and pipelines, because of their linear nature, cannot always be located to avoid all areas exhibiting environmental sensitivity to impacts. In the selection of sites, special attention is given to avoiding construction on steep topography and unstable soils, near streams and other open water areas, on cultural resource sites, and in threatened, endangered, or sensitive species habitats. It is not possible or practical to avoid all situations, and special construction techniques may need to be employed to minimize the impacts.

Well sites are usually located on the most level location available that accommodates the intended use consistent with reaching the geologic target. The drill site layout also can be oriented to conform to or fit into the topographic conditions at the drillsite. However, safety considerations in a hydrogen sulfide (H₂S) area may be an overruling factor when determining the topographic setting and providing adequate escape routes for the drill crew. In general, steeply sloping locations, which require deep, nearly vertical cuts and steep fill slopes, are avoided or appropriately mitigated. The well site also is reviewed to determine its effect in

conjunction with the location of the access road. Advantages gained on a good well site or tank battery location may be negated by adverse effects from the location of the access road.

4.1.6. Well-site Construction Standards

Construction of the well site must conform to the approved well site and layout plan in the Surface Use Plan of Operations (SUPO) and excavation of the cut-and-fill slopes of the well site are guided by information on the surveyed construction stakes. Generally, all surface soil materials (topsoil) are removed from the entire construction area and stockpiled. The depth of topsoil to be removed and stockpiled is determined at the predrilling inspection and stated either in the proposed SUPO or specified as a condition of approval. In order to avoid mixing topsoil with subsurface materials during construction and reclamation, topsoil stockpiles are located at specified locations, out of the way of construction activities.

Fill materials are to be compacted to minimize the chance of slope failure. Terracing may be used on both cut-and-fill slopes to reduce the land area occupied by the well site, to prevent excessive water accumulation, slope failure, and erosion. If excess material needs to be excavated, the excess material is to be disposed of or stockpiled at approved locations. Snow and frozen soil material cannot be used in the construction of fill areas and a reserve pit.

The area of the well pad that actually supports the drilling rig substructure must be level and capable of supporting the weight of the rig. The drilling rig, tanks, heater-treater, etc., are not placed on uncompacted fill material. The area used for mud tanks, generators, mud storage, and fuel tanks, etc., is usually slightly sloping to provide surface drainage from the work area. Runoff water from offsite areas is diverted away from the well site by ditches, waterbars, or terraces up-slope from the drilling and well site.

The reserve pit is to be located and constructed entirely in cut material. If this is not possible, at least 50% of the reserve pit must be constructed below original ground level to prevent failure of the pit dike. Pit dikes constructed of fill material are to be adequately compacted.

Pits improperly constructed on slopes may leak along the plane between the natural ground level and the fill. There is a significant potential for pit failure in these situations.

It may be required to line reserve pits to prevent contamination of ground water and soil. Bentonite, plastic, or other synthetic liners may be required. Fencing of reserve pits is usually required to prevent access to wildlife or livestock. In some environmentally sensitive areas or where topography limits the size of the well site, a "self-contained mud system" may be required. The drilling fluids, mud, and cuttings are stored in metal tanks and transported to approved offsite disposal areas.

A closed mud system and safety "surge tank" may be used in lieu of a reserve pit at locations such as areas with limited space in which to locate a drill pad, high-water-table area, or other situations where a reserve pit cannot be accommodated. The surge tank is used to contain the spent downhole fluids, muds, and cuttings from the wellbore. Since there is no reserve pit in which to dispose of the cuttings and spent drilling fluids they must be periodically trucked from the drill site during the drilling of the well and disposed of at an approved location. The removal

and disposal of the wellbore cuttings and spent drilling fluids is very expensive and closed mud systems, although not infrequently used, are not employed as a standard drilling practice.

4.1.7. Roads and Access Ways

It is Forest Service policy that existing roads be used for access when they are available, when they meet Forest Service standards for the intended use, and when there are no significant conflicts with other uses. When access involves use of existing agency roads, the oil and gas operator may be required to contribute to the road's maintenance. Usually this use is authorized by a joint use agreement in which each user's pro rata share of the road maintenance costs are assessed.

New road construction, or reconstruction, by the operator is consistent with the goals of the Forest's transportation plan and must meet Forest Service standards established for the intended road use.

Proper road location is critical for the engineering success and mitigation of the environmental effects of road construction. The surface and subsurface conditions of a proposed road location also determine the cost to survey, design, construct, and maintain a road. The following factors are considered when determining road locations: (1) intended use of the road, planned season of use, and type of vehicles to be used, (2) Forest's transportation plan, which may already identify feasible routes for the area, and (3) existing data including maps and aerial photos, of administrative, biological, physical, and cultural conditions of the area.

A field reconnaissance during the predrill inspection of the proposed and alternative routes is made to determine type of excavation, landslide areas, and subgrade conditions, indicating the need for surfacing, potential cut slope problems, surface or subsurface water problem areas, suitability of fill material, potential gravel pits or quarries for road aggregate, and potential borrow and waste sites.

When steep slope areas, erosion hazard zones, visually sensitive areas, stream crossings, and other areas of high environmental sensitivity cannot be avoided, special road design, and construction techniques may be required.

Both the BLM and the Forest Service require that all permanent roads constructed by nongovernmental entities across public or National Forest System lands be designed by, or constructed under the direction of, a licensed professional engineer. The design and construction requirements depend on the site conditions, planned use of the road, seasons of use, amount and type of traffic, and whether use will be short or long term. These factors also are used to determine the class of road built to accommodate the intended use(s).

The specific design specifications and requirements depend on whether the road class is (1) short term, (2) local, (3) collector; or (4) arterial road. The design and construction standards for these road classes are described in "Oil and Gas Roving Guidelines; R-4" and in "Surface Operating Standards for Oil and Gas Exploration and Development; USDI and USDA, Third Edition", as well as Forest Plan standards and guidelines for roads.

Other factors, unique and directly applicable to the oil and gas industry, considered include:

- The prevailing wind direction in relation to the potential for encountering sour gas (H₂S) and the need for a clear escape route from the drill site
- The potential for year-round operation (drillsites and producing locations may require all-weather access and special maintenance considerations for snow removal)
- The potential for exploratory drilling to result in a producing operation (the initial road alignments will be such as to allow upgrading to a permanent road if a discovery is made)

When the road location information is submitted to the Forest Service in the Surface Use Plan, the proposed route, and if applicable, alternative routes, road design standards and construction methods, are evaluated. Final approval of the road location, road design standards, and construction standards are made during processing of the Surface Use Plan.

4.1.8. Pipelines Standards

General pipeline construction standards were established to minimize surface disturbance, provide soil stability, and preserve reclamation potential. Pipeline construction usually involves clearing vegetation and leveling a strip of land wide enough to accommodate a pipeline trench, excavated material, and pipeline construction equipment and transport trucks. The width of the area cleared and leveled is kept to a minimum consistent with access and construction requirements. The width of the disturbed area varies depending on the number of lines within a corridor, size of the pipeline, equipment, and topographic setting.

Locating pipeline routes on steep hillsides and adjacent to live watercourses is avoided to the extent possible. However, because of the extended linear nature of a pipeline these situations cannot be entirely avoided. Extensive cuts and fills that destabilize steep slopes are major problems with sidehill locations. Pipelines located adjacent to watercourses increase the risk of petroleum spills and silt from construction sites entering streams.

Pipeline beds are constructed so they do not block, dam, or change the natural watercourse of any drainage. Pipelines suspended above watercourses must provide adequate clearance for water runoff and waterborne debris, and allow for the passage of wildlife and livestock. Pipelines located on gentle topography usually require less construction and surface disturbance, and are, therefore, inherently more stable and retain greater reclamation potential.

It is a standard practice to stockpile topsoil to the side of the pipeline right-of-way prior to construction and leveling the pipeline bed. The topsoil is segregated and not mixed or covered by excavated material during construction.

Upon completion of construction, the pipeline is graded to conform to the adjoining terrain, the surface soil material returned to the right-of-way, and the pipeline right-of-way waterbarred and revegetated to avoid erosion and minimize the visual intrusion.

4.1.9. Oil Field Production Development

Production operations in an oil field begin soon after the discovery well is completed. Portable and temporary facilities located on the drill pad are used to initiate the production of oil from the reservoir. As further drilling proceeds and reservoir limits are established, permanent production facilities are designed and installed at centralized locations. The type, size, and number of the facilities are determined by the number of producing wells, expected production rates, volumes of gas and water expected to be produced with the oil, the number of separate leases involved, and whether or not the field is being developed on a unitized or individual lease basis.

Development of production on a lease basis requires handling and processing facilities be installed on or near each lease. Unitization reduces the number of facilities needed to produce, process, and store the oil prior to marketing.

4.1.10. Gas Field Production Development

Production operations in a gas field begin when a pipeline to a market outlet is constructed. Market pipelines are not economical unless sufficient gas reserves have been proven to exist by drilling operations. Gas wells are often shut-in after completion for periods of several months or years until a pipeline connection becomes available.

4.1.11. Rate of Development

The rate at which development wells are drilled in a newly discovered field depends upon (a) whether the field is developed on a lease basis or unitized basis, (b) the probability of profitable production, (c) the availability of drilling equipment, (d) protective drilling requirements, and (e) the degree to which limits of the field are known. The development of a field that is based on a stratigraphic reservoir may proceed more slowly and yield more dry holes than development of a field located on a structural trap reservoir.

The most important factor when determining how fast field development is undertaken is indicated production potential. If large productive capacity and substantial reserves are indicated, development drilling proceeds at a rapid pace. If there is a question as to whether indicated reserves are sufficient to warrant additional wells, the development drilling occurs at a slower pace. An evaluation period to observe production performance may follow between the drilling of each well.

Development on an individual lease basis proceeds more rapidly than development in a unitized area. When development drilling is undertaken on a lease basis, each lessee drills his own well(s) to obtain production from the field. This creates a competitive situation where the first wells drilled produce the greatest share of oil from the reservoir and quickest and greatest return on investment. When unitized, all owners within the "participating area" share in a well's production regardless of whose lease the well is located on. The development of a reservoir then can proceed in an orderly manner and pace.

4.2. Protective Drilling

The drilling of a well to prevent drainage of petroleum to a producing well on an adjoining lease may be required in fields that contain a mixture of Federal lands and patented or fee lands. The terms of Federal leases require the drilling of a protective well on the leased tract if an "offset" well is located on adjacent non-Federal lands or on Federal lands leased at a lower royalty rate. An "offset" well is a well drilled at the next location in accordance with the established spacing rule to prevent the drainage of oil and gas to an adjoining tract where a well is being drilled or is already producing.

4.3. Pool Discoveries

Discovery of a "new pay zone" within an existing field is a "pool" discovery, as distinguished from a new field discovery. A pool discovery results in the drilling of additional wells -- often on the same well pads as existing wells, or often sharing the same boreholes or separated only by a few feet. Existing wells also may be drilled deeper to the new pay zone. Each new pay zone developed requires additional flowlines, storage, and treatment facilities if the fluids from the various pools are to be kept separate. Some fields contain as many as seven, or more, pay zones all sharing a geologic structure that created the conditions for the accumulation of oil and gas.

5. PHASE 4 - PRODUCTION

Production is a combination of operations that includes: (1) bringing the fluids (oil, gas, and water) to the surface; (2) maintaining and/or enhancing the productive capacity of the wells; (3) treating and separating the fluids; (4) purifying, testing, measuring, and otherwise preparing the fluids for market; (5) disposing of produced water; and (6) transporting oil and gas to market.

The production of oil and gas from a single well is usually initiated as soon as drilling is completed and the well is developed for production. In the meantime, other wells may be in production, being drilled, or exist only in the field development plans. Also, there is usually little time separation between the activities associated with exploratory drilling, oil and gas field development, and actual production of oil or gas. It may take a few months to several years before a field is fully developed. Therefore, field development activities and those activities normally associated with oil and gas production occur simultaneously during the early life of a field. Drilling of new wells is undertaken periodically throughout the life of a producing field to increase or maintain production from the reservoir.

5.1. Well Completion Report

A "Well Completion or Recompletion Report and Log" must be filed with the BLM within 30 days after completion of a well for production. The completion report reflects the mechanical and physical condition of the well. Geologic information and, when applicable, information on the completed interval and production is required. Operators must notify the BLM no later than the fifth business day after a well begins production. The information in these reports may be withheld from the public as proprietary information.

5.2. Well Completions

After a well has been drilled and evaluated for its economic worth and profit, work begins to set the casing and prepare the well for completion and production. The decision to complete an individual well for production is based on the type of oil or gas accumulations involved, the expected future development that may be undertaken during the life of the well, and the economic circumstances at the time that the work is done. Completion equipment and methods employed vary.

Well completion involves installation of steel casing between the surface casing and the oil and gas producing zone. The casing is cemented between the wellbore and casing wall to provide stability and to protect specific zones (i.e., fresh water aquifers). The casing is perforated opposite the "pay zone" and the "pay zone" may then be "stimulated" or "treated" to increase productivity.

The drilling rig and most of the support equipment are moved from the wellsite after the casing is cemented and the pay zone is stimulated. Small diameter "production" tubing is then placed inside the casing down to the producing zone. The tubing is connected to the surface equipment and transports the oil and gas from the bottom of the well to the surface. If the pressure is sufficient to raise a column of oil to the surface the well is completed as a flowing well. When pressure is not sufficient, a pumping system is installed. After the well is completed, the well is tested for a period of days or months before another well is drilled.

Temporary storage tanks are normally used to hold the produced oil during testing. A "separator" is required to separate the gas from the oil. The gas separated from the oil may be burned off as waste until a pipeline connection is available. This flaring requires prior approval from the BLM in accordance with NTL-4A, Beneficial Use. If water is produced with the oil, a "treater" is needed to separate emulsified oil and water.

5.3. Well Stimulation

"Well stimulation" is employed to enlarge channels or to create new ones in the producing formation rock to enhance oil and gas production. Since oil is usually contained in the pores or cracks of sand or limestone formations, enlarging or creating new channels allows the oil or gas to accumulate and move more freely to a wellbore. A well may be restimulated several times during its lifetime to maintain or increase production. There is a short-term increase in activity at the well site during this process. Generally no new surface disturbance is required to perform these operations. Two basic well stimulation methods have been developed: acid treatment, and hydraulic fracturing.

Acid treatment dissolves rock with weak hydrochloric acid, thereby enlarging existing channels and opening new ones for oil to flow to the wellbore. Reservoir rocks most commonly acidized are limestone (calcium carbonate) and dolomite that exhibit low permeability. Well servicing rigs are used to prepare both new and old wells for acid treatment.

Hydraulic fracturing is used to create or enlarge cracks in sandstone reservoirs in the same manner as acid treatment is used in limestone or dolomite reservoirs. Hydraulic pressure is

applied against the formation by pumping fluid, under high pressure into the well. This pressure splits and cracks the rocks to improve the productivity of the well, or increase the rate fluids can be injected into disposal wells. Most well pads are of sufficient size to accommodate the trucks and other equipment needed to complete a "frac" job, however, a second pad and additional surface disturbance may be required for safety considerations and to accommodate the large amount of equipment needed to perform special "massive fracture" jobs.

5.4. Oil Wells - Wellhead Facilities

The "wellhead" is the equipment installed to maintain control of the well at the surface and to prevent well fluids from "blowing" or "leaking" at the surface. The pressures encountered in the well determine the type of wellhead equipment needed. This varies from a simple assembly to support the weight of the production tubing in the well to a high-pressure wellhead to control reservoir pressures. Pressures in these reservoirs are usually great enough to result in a "flowing" well. However, after reservoir pressures are depleted, some type of artificial lift is usually required to bring the oil to the surface.

5.4.1. Flowing Wells

The surface equipment at the head of a flowing well is limited to a series of valves, or "Christmas tree," and a fenced service area ranging from 15 feet by 15 feet to 50 feet by 50 feet around the wellhead. A service area also may contain a small (1 foot by 2 feet by 3 feet) gas powered chemical pump and "guy line" anchors for servicing units brought in for well repairs. Chemical pumps used to inject emulsion breakers, corrosion inhibitors, or paraffin solvents into the well or flowline may be present.

5.4.2. Artificial Lifts (Pumping)

When a well is completed, the natural reservoir pressure drives the fluid to the surface. At some time during the life of an oil well, the pressure is depleted and some form of artificial lift is used to raise the fluid to the surface. The most common methods of artificial lift are sucker rod pumps, centrifugal pumps, hydraulic pumps, and gas lift. All of the pump systems require some type of surface equipment and a power system. All power systems generate noise; however, this ranges from almost none for electric motors to high noise levels for single cylinder gas engines.

5.4.2.1. Sucker Rod Pumps

The pumping unit is the most visible and recognizable piece of equipment within oil fields. Pumping units vary in size from 4 feet to over 25 feet in height depending on depth of well. The principle of the sucker rod pump is the same as that of the common hand pump used to lift water. A series of rods and a valve move up and down through a "stuffing box" in the well to bring the oil to the surface. The stuffing box is regularly maintained to prevent oil leaks from the wellhead. Failed packing in stuffing boxes is a common cause of oil spills. The rod is connected to a reciprocating pumping unit or "pump jack". Surface pumping units are usually powered by electric motors; however, internal combustion engines are used when electric power is not available. Single-cylinder engines operate at very high noise levels, whereas multi-cylinder engines operate at lower noise levels and electric motors at a very low noise level.

5.4.2.2. Centrifugal Pumps

Centrifugal submersible oil well pumps consist of a stack of 25 to 300 electric powered small pumps located inside the well casing. Centrifugal pumps require little equipment above the ground and generate no noise at the surface. Surface equipment requirements include a switch or control cabinet, the wellhead, a spool for the cable used to transmit electricity to the pumps, and an electric powerline.

5.4.2.3. Hydraulic Pumps

The pumping unit of a hydraulic system is located inside the well and is powered by oil under high pressure. The equipment required on the surface includes a storage tank for the power oil, a pump to pressurize the oil, an electric motor or internal combustion engine to power the oil pump, power oil regulating valves and pressure gauges, hydraulic pump and the oil wells. The total surface area used for this type of facility may be greater than for other pumping systems if a centralized power system and additional oil pressure lines are used to carry the power oil from the pump to the wellheads. The noise level created at the wellhead depends on whether an electric motor or internal combustion engine is used to power the oil pump.

5.4.2.4. Gas Lift

Gas lift is commonly used where low-cost, high-pressure natural gas is available and where pressure in the petroleum reservoir is sufficient to force the petroleum part of the way up the well. In this system natural gas under pressure is injected into well casing. The gas forces the fluids up the production tubing to the surface. The gas pressure maintained inside the casing creates a flowing well. The surface equipment used for gas lift includes gas compressor, oil storage tank, and separator. The system is quiet if the compressor is powered by electric motor and little physical space is required at the wellhead.

5.5. Gas Wells

Most gas wells produce by normal flow and, in most cases, do not require pumping. Surface use at a flowing gas well usually is limited to a 20-foot by 20-foot fenced area. Water may enter a gas well and choke off the gas flow. A pump then is installed to pump off the column of water. Some gas wells may require periodic to almost continual water pumping. The typical gas wellhead facilities are similar to those of a flowing oil well, consisting of a relatively unobtrusive wellhead "Christmas tree".

5.6. Oil Field Gathering Systems

Crude oil is transferred in small diameter pipelines called "flowlines" from the wells to treatment facilities and central tank storage battery before it is transported from the lease. The flowlines may be constructed with 3- or 4-inch-diameter steel pipes, but plastic pipe is more commonly used.

Flowlines are usually buried; however, under certain circumstances, may be elevated above the ground. The installation of flowlines is similar to small scale pipeline construction. Generally, a

level bed is constructed to provide for vehicle access, trenching, and burial of the flowline. Flowlines are often installed in, or adjacent to, a roadbed to reduce surface disturbance and facilitate its installation.

After the oil is gathered from the field and is treated, measured, and tested, it will be transported from the lease by pipeline or trucked to market.

5.7. Gas Field Gathering Systems

Natural gas is often sold at the wellhead and transported directly off the lease. If processing and conditioning are required to remove liquid hydrocarbons, "associated gases", and water, the gas may be transferred to a central collection point and treating facility through flowlines prior to sale. All gas gathering systems include equipment for (1) conditioning and upgrading the gas; (2) compressing the gas so that it flows through the pipelines; and (3) controlling, measuring, and recording its flow.

5.8. Oil and Gas Separating, Treating, and Storage Facilities

Fluids produced from a well normally contain oil, gas, and water. The oil, gas, and water are separated or treated before the oil is stored in the tank battery. The treating facilities may be located at the wellhead, but in a fully developed field, they are usually located at the tank battery site. If enough "natural gas" is produced with the oil to warrant separation, it will be separated from the fluids, compressed, and pipelined direct to market.

Enough "casinghead gasoline" or "drip gas" may be produced in the field to make it economical to process it for marketing. A "gasoline" plant may then be built in the area to remove natural gasoline, butane, and propane. Some of the residue gas may be used to fuel gas compressors, pump engines, and heat the separating and treating vessels. The remainder of the gas is marketed.

The oil and water produced from a well are usually in the form of an emulsion. Water is separated and removed after the gas is removed. The type of treatment facilities used depends on the amount of emulsification. If emulsification is high, chemical and/or heat treatment is used to separate the oil and water. Heat is applied in a facility called a "heater-treater", which breaks the oil in water emulsification. The heat is supplemented in most cases by chemical emulsion breakers. The oil and water, when not highly emulsified, may be separated by gravity in a tall settling tank called a "gun barrel". Conditioning equipment such as separators, heaters, dehydrators, and compressors may be located at the wellhead where the oil and gas first reach the surface or at the tank batteries and/or gas compressor stations in the field.

After the oil and water are separated, the oil is piped to storage tanks (tank batteries). The tank batteries are usually located on, or in the vicinity of, the lease. Tank batteries usually contain at least two tanks. The number and size of tanks vary with the rate of petroleum production from the field. Small leases may contain only one tank battery; large leases or units may contain several, each with its own separating, treating, and storage facilities. Tank battery sites may occupy from one to five acres depending on associated facilities and number and size of tanks.

Although natural gas is produced in varying quantities with the crude oil, in many fields the primary or sole production is the natural gas itself. The field processing to upgrade the gas for transportation and marketing consists of two primary treatments. The first is to separate the natural gas from crude oil and/or other liquid condensates including free water. In this process the gas is run through "separators" and "heater" to separate the liquids from the gas. The gas then is run through a "dehydration unit" to remove the remaining water vapor. The removal of the water vapor is important since in the presence of natural gas or other hydrocarbons it will form "hydrates" that precipitate out and cause blockage of pipelines. The treatment of the gas is done either at the wellhead or at a centralized field facility located at the tank battery site or at a compressor plant. No gas is stored at these facilities, but is entered directly into a marketing pipeline after treatment.

Hydrogen sulfide (H_2S) and carbon dioxide (CO_2) are "associated gases" commonly produced with the natural gas. H_2S is extremely toxic, heavier than air, highly corrosive to unprotected metal, and will cause eventual failure of the metal. Unless these gases are present in very small quantities they must be removed from the natural gas. There are several processes used to remove "acid gases". The most common is the alkanolamine process in which the gas is absorbed in an alkanolamine solution. Large compressors are used to compress the gas up to, or in excess of, a hundred times the normal atmospheric pressure. Large reciprocating compressors driven by gas engines are used, but centrifugal units driven by gas turbines or electric motors are also used. Large compressor stations along the pipeline often use natural gas from the pipeline for fuel. Compressor stations operate at a high noise level and are normally housed in large metal buildings. Storage and maintenance facilities for the gas field's operations are usually located at the compressor station. Compressor stations are the largest and most visible features in a gas field and are the center of most of the human activity.

5.8.1. Disposal of Produced Water

After water is separated from oil at the tank battery, it is disposed of under BLM approval and supervision. Although most produced waters are brackish to highly saline, some produced waters are fresh enough for beneficial surface use.

Produced water from oil and gas operations is disposed of by subsurface injection, lined pits, unlined pits, or other methods acceptable to the BLM, in accordance with the requirements of Onshore Order No. 7. Disposal of produced water by disposal/injection wells requires permit(s) from the primacy State or Environmental Protection Agency (EPA). Approval of surface use by the Forest Service also is required.

The advantages and disadvantages of the alternative water disposal systems vary. Surface systems (lined evaporation pits) may require an area larger than the tank batteries. Because saltwater seldom issues from heater-treaters completely free from oil, oil skimmer pits are installed between the separating facilities and the evaporation pits. If a skimmer or evaporation pit is accidentally breached, oil and/or saltwater spills may occur. Evaporation pits do not work efficiently at high elevations and cool temperatures. Evaporation and skimmer pits are hazardous to waterfowl and other wildlife because of the residual oil.

When saltwater is disposed of underground, it is introduced into a subsurface horizon containing water of equal or poorer quality. Also, it may be injected into the producing zone from which it originated to stimulate oil production. Dry holes or depleted wells may be converted for saltwater disposal. Occasionally new wells will be drilled for this purpose. An injection pump is used to force the saltwater into the disposal zone. Saltwater is prevented from migrating up or down from the injection zone and into other formations in disposal wells.

Although not a secondary recovery process, saltwater disposal is a common form of fluid injection. Its primary purpose is simply to dispose of the saltwater produced with crude oil. A typical system is composed of collection centers in which saltwater from several wells is gathered, a central treating plant in which corrosion-forming substances are removed, and a disposal well. The saltwater is injected into the originating zone and used to pressurize and drive the oil towards the borehole of a producing well.

5.8.2. Secondary and Enhanced Recovery of Oil

Oil, gas, and water are typically trapped within fine rock pores under high pressure in the oil reservoir. Expansion of pressurized water and gas in solution forces oil out of the rock pores into the well and up to the surface. This is known as the "primary drive" or "primary recovery". Oil flowing out of the rock drains energy from the formation; pressure in the reservoir begins to slowly decline; primary drive diminishes and the production rate falls. The oil cannot be produced unless pressures within the reservoir are maintained or restored to cause displacement of the oil being held in the rock and to drive it to the wellbore. Usually, only 15 to 20% of the oil is recovered from a reservoir during primary production. As reservoir pressures continue to drop, gas in the oil escapes, forming bubbles in the rock pores. Installation and implementation of a secondary and enhanced recovery system significantly increase a field's productivity and longevity. Many reservoirs are developed for secondary and enhanced recovery early in the life of a field.

5.8.2.1. Secondary Recovery Methods

Fluid injection is a secondary recovery operation in which a depleted reservoir is restored to production by the injection of liquids or gases (from extraneous sources) into the wellbore. In essence, this injection restores reservoir pressures and moves the formerly unrecoverable oil through the reservoir to the well. Fluids are injected into selected wells at, or near, original pressure levels to achieve maximum recovery efficiency. Two of the more common fluid injection methods are waterflood and saltwater disposal.

The installation of a secondary recovery system involves drilling of injection wells and new recovery wells or conversion of production wells to injection wells. Fluid injection lines are installed and additional water separation and storage facilities constructed to implement the secondary recovery system. Secondary recovery results in a significant increase in the amount of water produced. Additional land area is needed to accommodate water supply facilities, water storage and treating facilities, water injection pumps, and waterlines to wells. Drilling and construction and other human activities intensify in the oil field during installation of a fluid injection system.

Waterflood - The most commonly employed form of secondary recovery is waterflooding. Water is injected into the reservoir under pressure to drive additional oil to the producing wells. On the average, a successful waterflood doubles the amount of oil recovered from a reservoir. In some fields, water for waterfloods is injected into depleted existing wells. In other cases, additional wells may need to be drilled for water injection. Most waterfloods are difficult to operate on a lease basis, so entire fields, if not already being operated under a unitization agreement, are usually unitized before flooding. If unitization precedes a waterflood, there is little or no duplication of secondary recovery facilities. However, additional surface area is used for the water supply facilities, water storage and treating facilities, water injection pumps, and waterlines to injection wells. If the injection well is a converted producing well, the waterline replaces the producing flowline. If the injection well is a converted dry hole or a new well drilled for the waterflood, the water injection line is the only addition to the pipeline system and requires the same amount of land as a flowline for a producing well.

Gas Injection - Gas injection is a secondary recovery technique that is generally used only in oil and gas reservoirs that have an existing gas cap. Natural gas is injected under pressure to restore and maintain reservoir pressures to displace and move oil to the producing wells.

5.8.2.2. Enhanced Recovery Methods (Tertiary recovery)

Enhanced recovery methods increase the amount of oil produced and recovered from an oil reservoir beyond that obtained from primary and secondary methods. Enhanced oil recovery techniques employ chemicals, water, gases, and heat singly, either singly or in combination, to reduce the factors that inhibit oil recovery. Considerable technical and financial risk is involved because of the large investment in equipment and the unknown factors or characteristics of the oil reservoir that may affect the success of an enhanced recovery method. There are three broad categories of enhanced recovery methods currently used; namely (1) thermal enhancement, which primarily involves injecting high-pressure steam into the oil reservoir to reduce oil viscosity and increase its ability to flow; (2) miscible flood, in which propane, butane, natural gas, CO₂, or other gases are injected into the reservoir to dissolve and displace the oil; and (3) chemical enhancement, which includes injecting polymers to thicken injected waters to increase uniformity of oil displacement in the reservoir or injecting detergents ("surfactants") that essentially "wash" the oil from the reservoir rocks.

As with secondary recovery systems, additional land surface is required to accommodate the injection and oil recovery systems. This includes additional wells, injection lines and flowlines, roads, storage, and treatment facilities, pumps, and injection equipment. There also is an increase in construction and drilling activities during the installation of all enhanced recovery systems.

5.9. Transportation Pipelines

A transportation pipeline is needed in order to transport natural gas and oil to market or refineries. In most cases, oil is transported to the refinery via a pipeline, although trucks may be used to transport oil from isolated fields or new fields to pipeline terminals or the refinery.

Oil is moved through the pipeline by pumps. Pump stations are located either at gathering stations or trunkline stations or a combination of both. A gathering station is located in or near an oil field and receives oil through a pipeline gathering system from the operators' tanks. From the gathering station, oil is relayed to a trunkline station, which is located on the main pipeline, or trunkline. The trunkline station relays the oil to refineries or shipping terminals. To maintain pressure, booster pumps are spaced along the trunkline. Tank batteries located along the line receive and temporarily store the oil before it continues.

Months and sometimes years of engineering studies and surveys of potential gas reservoirs and markets precede the final decision to build a pipeline.

Construction of a large transportation pipeline may involve as many as 250 to 300 men in a normal operation and up to 500 men in a very large operation. The amount of construction equipment needed depends on the variety and difficulty of terrain. Stream crossings, marshes, bogs, heavily timbered forests, steep slopes, or rocky ground can require different types of equipment and construction practices. 250 to 300 men can move at a rate of three miles a day with a distance of sometimes 10 or 15 miles separating the beginning of the work crew from the end.

In practice, a strip of land from 50 to 75 feet wide is cleared depending on the size of the pipe and the type of terrain. The clearing crews open fences and build gates, cattle guards, and bridges. Salable timber cut by clearing crews is stacked; the rest is cut and disposed of. A roadway capable of supporting vehicle access is graded and completed adjacent to the pipeline. The cleared area needs to be wide enough for the pipeline trench, the largest side-boom tractor, and transportation of pipe and equipment. In rocky terrain, a machine equipped with a ripper that extends several feet into the ground is often used to loosen rocks for removal before the ditching operation begins.

A ditch is made by loose-dirt ditching machines or by wagon drills suspended from side-boom tractors. Dynamite blasting is used for very hard rock surfaces. Pipe is transported to the ditching sites where the pipe is coated, double jointed, welded, and lowered into the ditch. The pipe must be buried deep enough to ensure that it does not interfere with normal surface uses. The Department of Transportation requires a minimum of 36 inches of cover. The trench is backfilled, compacted, and the cleared area waterbarred, and revegetated.

5.10. Well Servicing and Oil and Gas Field Maintenance

Producing wells in active oil and gas fields periodically require repair and workover operations. Operations involving no new surface disturbance to redrill, deepen, and plug-back require prior approval of the authorized officer of the BLM. In some cases, these operations require the approval of the Forest Service. No prior approval or subsequent report is required for well clean-out work, routine well maintenance, bottom hole pressure survey, or for repair, replacement, or modification of surface production equipment provided no additional surface disturbance is involved.

When prior approval is required, the operator must submit a Sundry Notice, or APD, as applicable. A detailed written statement of the plan of work must be provided to the authorized

officer with the appropriate form. When additional surface disturbance will occur, a description of any subsequent new construction, reconstruction, or alteration of existing facilities, including roads, damsites, flowlines and pipelines, tank batteries, or other production facilities on any lease, must be submitted to the authorized officer for environmental reviews and approvals. On National Forest System lands, the BLM coordinates with the Forest Service to obtain their approval on the surface disturbing activities. Emergency repairs may be conducted without prior approval provided the authorized officer is promptly notified.

The servicing of individual wells to improve or maintain oil and gas production is an activity that extends throughout the life of the field. This work is usually performed with the use of a well servicing unit or self-propelled workover rig, which is similar to a scaled down oil rig. Both the workover rig or well-servicing unit carry hoisting machinery that is used to pull sucker rods and tubing from the wellbore. The most common well-servicing operations conducted are: cleaning out the well, changing pumps, repairing rod string and tubing, changing the producing and reestablishing oil producing intervals, installing artificial lift, and repairing casing and other downhole equipment. There is an intense, but short-term, increase in human and motorized activity at the well site during servicing.

Construction, reconstruction, and normal maintenance work continue throughout the field's life. Flowlines, pipelines, pumping units and other oil and gas field equipment, no longer functional because of corrosion, metal fatigue, wear, or because it has become outdated and inefficient, is replaced, upgraded, or abandoned and removed. Major and minor maintenance activities are a normal part of the operations during the life of the oil and gas field.

5.10.1. Pollution Control

All spills or leakages of oil, gas, produced water, toxic liquids or waste materials, blowouts, fires, personal injuries, and fatalities must be reported by the operator to the BLM and the surface management agency. The BLM requires immediate reporting of all major undesirable events (more than 100 barrels of fluid/500 MCF of gas released or fatalities involved). A spill prevention, control, and countermeasure plan (SPCC) is required by the EPA under 40 CFR Part 112 and any discharge of oil (oil spill) must be reported immediately to the National Response Center, EPA (See 40 CFR 110).

Firewalls/containment dikes must be constructed and maintained around all storage facilities/batteries. The containment structure must have sufficient volume to contain, at a minimum, the entire content of the largest tank within the facility/battery, unless more stringent site-specific protective requirements are deemed necessary by the authorized officer.

5.10.2. Inspection and Enforcement

The BLM and Forest Service have developed procedures to ensure that leaseholds, which are producing or expected to produce significant quantities of oil or gas in any year, or have a history of noncompliance, are inspected at least once a year. Other factors such as health, safety, and environmental concerns, and potential conflict with other resources also determine inspection priority. Inspections of leasehold operations ensure compliance with applicable laws, regulations, lease terms, Onshore Oil and Gas Orders, NTLs, other written orders of the

authorized officer, and the approved plans of operation. The administration of oil and gas operations on National Forest System lands is conducted in accordance with 36 CFR 228.111 through 36 CFR 228.114.

6. PHASE 5 - ABANDONMENT

All abandonments, whether they involve one wildcat well, a well no longer productive, or an entire leasehold, require the approval and acceptance of the abandonment of the individual well(s) by the BLM and the Forest Service. An acceptable abandonment includes (1) the plugging of the wellbore and (2) reclamation of the land surface to a stable and productive use.

6.1. Approval of Abandonment

Well abandonment operations may not be started without prior approval of a "Sundry Notices and Reports on Wells" by the authorized officer of the BLM. The Sundry Notice serves as the operator's Notice of Intent to Abandon (NIA). In the case of newly drilled dry holes, failures, and in emergency situations, oral approval may be obtained from the authorized officer followed by written confirmation. In such cases, the surface reclamation requirements will have been discussed with the operator and stipulated in the approved APD. Additional surface reclamation measures may be required by the Forest Service. For older existing wells, not having an approved surface use plan of operations, a reclamation plan must be submitted with the NIA. Reclamation requirements are part of the approval of the NIA. The operator must contact the BLM prior to plugging a well to allow for approval and witnessing of the plugging operations.

6.2. Plugging of Wells

The purpose of plugging a well is to prevent fluid migration between zones within the wellbore to protect aquifers of useable quality water, to protect other minerals from damage, and to assist in the reclamation of the surface area. Well plugging requirements vary with the characteristics of the rock, geologic strata, well design, and reclamation requirements. For wells no longer capable of production, all perforations must be isolated so as not to allow fluid to migrate up hole or the surface. The perforations may be isolated by: 1) placing a cement plug across the perforations and extends 50 feet above and below the perforations, or 2) setting a cement retainer (cement tool that acts like a plug except that cement can be pumped below the tool but no fluid can pass above the tool) +/- 100 feet above the perforations and pumping a sufficient volume of cement into the perforations, or 3) setting a bridge plug (a tool similar to a cement retainer except that no fluid can pass in either direction) +/- 100 feet above the perforations and placing 50 feet of cement on top of the bridge plug. The production casing may be removed. If the casing is cut and removed, the casing stub (the top of the casing remaining in the hole) must be plugged with a 100 foot cement plug to extend 50 feet inside the casing stub and 50 feet outside the casing stub (open hole). If casing is not removed the surface casing shoe must be isolated by perforating the production casing near the surface casing shoe. A cement retainer must be set +/- 100 feet above the perforations and a sufficient volume of cement is pumped below the retainer, through the perforations, and between the outside of the production casing and the inside of the surface casing for a distance of 100 feet. All cement plugs must have sufficient volume to fill 100 feet of hole plus an additional volume of 10% per 1000 feet of depth

(a 100 foot plug at 5000 feet would be required to have an additional 50 feet of cement). At the surface, all annular spaces must be plugged with at least 50 feet of cement.

The operator's plan for plugging and abandonment is submitted with the Notice of Intent to Abandon and is reviewed for completeness and adequacy. Although the plugging of each well must be designed individually, the minimum requirements are described below.

In open hole situations, cement plugs must extend at least 50 feet above and below zones with fluid that has the potential to migrate, zones of lost circulation (this type of zone may require an alternate method to isolate), and zones of potentially valuable minerals. Thick zones may be isolated using 100-foot plugs across the top and bottom of the zone. In the absence of productive zones and minerals, long sections of open hole may be plugged by placing plugs every 3,000 feet. In cased holes, cement plugs must be placed opposite perforations and extending 50 feet above and below except where limited by plug back depth. (See Onshore Oil and Gas Order No. 2)

A permanent abandonment marker is required on all wells unless waived by the Forest Service. This marker pipe is usually four feet above the ground and embedded in cement at the borehole site. The pipe is capped and the well's identity and location permanently inscribed.

Dry wildcat and development wells are normally plugged before the drill rig is removed from the wellsite. This allows the drill rig to plug the hole and avoid the necessity of bringing in other plugging equipment.

Before a lessee/operator abandons a well no longer capable of production, it must be shown that it is no longer suitable for profitable operation. Wells are normally plugged when they are no longer capable of production. However, if a well has potential for use in a secondary recovery program, it may be allowed to stand idle. Truck-mounted equipment is used to plug former producing wells.

6.3. Surface Reclamation

A reclamation plan is a part of the Surface Use Plan of Operations. Reclamation may be required of any surface previously disturbed that is not necessary for the continued well or other operations. When abandoning a well and other facilities that do not have a previously approved reclamation plan, a plan must be submitted with a NIA. Additional reclamation measures may be required based on the conditions existing at the time of abandonment. Any additional reclamation requirements are made part of the conditions of approval of the NIA. The general standards and guidelines for reclamation and abandonment of oil and gas operations are set forth in the third edition of the Surface Operating Standards for Oil and Gas Exploration and Development. Additional standards and requirements may be applied to accommodate the site-specific and geographic conditions of the reclamation site.

Prior to the start of reclamation, all equipment and trash must be removed from the well site or the area to be reclaimed. When an entire lease is abandoned, the separators, heater treaters, tanks, and other processing and handling equipment are removed and the surface restored.

Flowlines and injection lines installed on the surface are removed, but buried lines usually are left in place.

6.3.1. Well Site Reclamation

Well site reclamation must be planned on both producing and abandoned well sites. The entire site, or portion not required for the continued operation of the well, is reclaimed.

When they are dry, all excavations and mud pits must be closed by backfilling and graded to conform to the surrounding terrain. Waterbreaks and terracing may be installed to prevent erosion of fill material.

Cut and fill slopes must be reduced and graded to blend the site to the adjacent terrain. The well site may be recontoured by bringing the construction material back onto the well pad and reestablishing the natural contours where desirable. Areas surfaced with gravel are buried deep in the recontoured area to prevent possible surface exposure.

The topsoil is replaced on the reclamation area and prepared to provide a seedbed for reestablishment of desirable vegetation. Standard reclamation practices may include contouring, terracing, gouging, scarifying, mulching, fertilizing, seeding, and/or planting.

6.3.2. Reserve Pit Reclamation

All pits must be reclaimed to a natural condition similar to the rest of the reclaimed well site area. In addition, the reclaimed pit must be restored to a safe and stable condition. In most cases, if a pit contains a synthetic liner, the pit is not to be trenched (cut) or filled while still containing fluids. Pits must be allowed to dry, be pumped dry, or solidified by adding cement in situ prior to backfilling. The pit area is usually mounded to allow for settling. The mounding allows for positive surface drainage off the reclaimed pit, which lessens the possibility of leaching or lateral movement of undesirable substances from the buried pit into surface streams or shallow aquifers.

The concentration of hazardous substances in the reserve pit at the time of pit backfilling must not exceed the standards set forth in the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). All oil and gas drilling-related CERCLA hazardous substances removed from a location and not reused at another drilling location are disposed of in accordance with applicable state and federal regulations.

6.3.3. Road Reclamation

Roads no longer needed for oil and gas operations and not within the Forest Service Transportation System must be abandoned, closed, and obliterated. Reclamation of abandoned roads will involve one or more of the following techniques: (1) recontouring to the original contour, (2) recontouring to blend with natural contours, (3) recontouring only selected sections of the roadway, and (4) obliteration of the roadway surface with no other modification of the road profile. Reclamation treatments also may include ripping, scarifying, waterbarring, and barricading. Stockpiled soil, debris, and fill materials are replaced on the roadbed and the road reseeded in accordance with the approved site-specific reclamation plan.

6.3.4. Pipeline and Flowline Reclamation

Abandonment and reclamation of pipelines and flowlines, similar to the reclamation of abandoned roads involve replacing fill material in the original cuts, reducing and grading cut and fill slopes to conform to the adjacent terrain, replacement of surface soil material, waterbarring, and revegetating in accordance with the reclamation plan.

Pipeline trenches are compacted during backfilling and must be maintained to correct backfill settling and prevent erosion. Waterbars and other erosion control devices are repaired or replaced as necessary.

6.3.5. Revegetation

Disturbed areas are revegetated after the site has been contoured, graded, and the soil surface satisfactorily prepared. In order to minimize the soil erosion potentials and provide a stable seed bed, site preparation may include ripping, contour furrowing, terracing, reduction of steep cut and fill slopes, waterbarring, etc. Revegetation involves seeding, planting of containerized plants, or a combination of the two. Native perennial species, or other plant materials specified by the Forest Service are used. The oil and gas operator is advised as to species, methods of revegetation and seasons to plant. Seeding is normally done by drilling on the contour or by other approved methods. Seeding and/or planting is repeated until satisfactory revegetation is accomplished, as determined by the Forest Service. Mulching, fertilizing, fencing, or other practices also may be required depending on site-specific conditions.

6.3.6. Visual Resources

For all activities that alter landforms, disturb vegetation, or require temporary or permanent structures, the operator is required to comply with visual resource management objectives for the area. Site-specific mitigation practices may be required by the Forest Service to avoid or minimize changes in the character of the landscape or minimize the impacts of unnatural intrusions on the landscape.

6.3.7. Additional Requirements

Additional reclamation methods and techniques that reflect local site conditions are required. Technical advances in reclamation practices that may be successfully applied to oil and gas construction are continually being developed.

6.3.8. Inspection and Final Abandonment Approval

Final abandonment is not approved until the surface reclamation work required by the APD or NIA is completed and the required reclamation is acceptable to the Forest Service. The operator must file a Subsequent Report of Abandonment (SRA) following the plugging of a well. A Final Abandonment Notice (FAN), which indicates that the site is ready for inspections, must be filed upon completion of reclamation.

6.3.9. Release of Bonds

If the well is covered by an individual lease bond, the period of liability on that bond is terminated once the final abandonment or phased bonding release has been approved. The principal can request termination of the period of liability from the BLM State Office holding the bond. If the well is covered by a state-wide or nation-wide bond, termination of the period of liability of these bonds is not approved until final abandonment of all activities conducted under the bond have been approved by both the BLM and Forest Service.

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APPENDIX F:

LEASING PROCESS

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1. INTRODUCTION

In many places in the United States, National Forests lie over geological formations which do, or may, contain oil or natural gas. Private firms purchase "leases" on many of these lands to search for oil or gas, to drill exploratory wells, and to extract any oil or gas located below them.

2. LEASE

Individuals, associations of citizens, and corporations organized under the laws of the United States or any state, are entitled to lease federal lands for these purposes under authority of the *Mineral Leasing Act* of 1920, as amended, and by the *Mineral Leasing Act for Acquired Lands* of 1947 unless the lands have been specifically withdrawn by the Department of the Interior.

Leases also may be issued to a legal guardian or trustee on behalf of a minor. Aliens, whose country of origin does not deny similar privileges to United States citizens, may hold interest in leases, but only through stock ownership of United States corporations that hold leases. Aliens may not hold interest in federal oil and gas leases through units in publicly traded limited partnerships.

The issuance of a lease grants to the lessee the exclusive right to use so much of the leased lands as is necessary to explore for, drill for, mine, extract, remove, and dispose of all the oil and gas (except helium) in the leasehold subject to stipulations attached to the lease; restrictions deriving from specific, nondiscretionary statutes; and such reasonable measures as may be required by the authorized officer to minimize adverse impacts to other resource values, land uses or users not addressed in the lease stipulations at the time operations are proposed. To the extent consistent with lease rights granted, such reasonable measures may include, but are not limited to, modification to siting or design or facilities, timing of operations, and specifications of interim and final reclamation measures. At a minimum, measures shall be deemed consistent with the lease rights granted provided that they do not require relocation of proposed operations by more than 200 meters (656 feet), require that operations be sited off the leasehold, or prohibit new surface disturbing operations for a period in excess of 60 days in a lease year (43 CFR 3101.1-2).

2.1. Competitive and Non-Competitive Lease

Competitive and noncompetitive leases may be obtained for oil and gas exploration and development on lands owned or controlled by the federal government. The Leasing Reform Act of 1987 requires all public lands available for oil and gas leasing to be offered first by competitive leasing at an oral auction. Noncompetitive leases may be issued only if the competitive process results in no bids. Competitive and noncompetitive leases are issued for a ten-year period. Both are extended for the duration that they are producing oil and gas in paying quantities. The maximum competitive lease size is 2,560 acres in the "lower" 48 states and 5,760 acres in Alaska. The maximum noncompetitive lease size is 10,000 acres in all states.

2.1.1. Competitive Leases

The Bureau of Land Management (BLM) conducts oral auctions for oil and gas leases on at least a quarterly basis, when there are available parcels of land. A Notice of Competitive Lease Sale lists lease parcels to be offered at auction. The Sale Notice is published at least 45 days before the date of the auction. The Sale Notice identifies any lease stipulations to uses or restrictions on surface occupancy. There are three sources for federal lands available for lease:

- Existing leases that have expired, and leases that have been terminated, canceled, or relinquished,
- Parcels identified by informal expressions of interest from either the public or BLM for management reasons, and
- Lands included in offers filed for noncompetitive leases (effective January 3, 1989).

On the day of the auction, successful bidders must submit a properly executed lease bid form and make a payment consisting of a share of the sale costs (\$75 per lease), one-year advance rental (\$1.50 per acre), and not less than the \$2.00 per acre minimum bonus. The balance of the bonus bid must be received within ten working days of the auction. The bid form constitutes the legally binding lease offer.

2.1.2. Non-competitive Leases

Non-competitive leases may be issued only for parcels that have been offered competitively and failed to receive a bid. Lands in expired, terminated, cancelled, or relinquished leases are not available for noncompetitive leasing until they have been offered competitively. After an auction, all lands that were offered competitively without receiving a bid are available for issuance of noncompetitive leases for a period of two years.

Non-competitive offers must be submitted on a BLM-approved form, and they must include a \$75 filing fee, and one-year advance rental (\$1.50 per acre). Non-competitive lease offers filed on the first business day following the auction are considered as having been filed simultaneously. The priority among multiple offers received on the first business day for the same parcel is determined by drawings open to the public.

2.2. Lease Restrictions

A lease does not convey an unlimited right to explore or an unlimited right to develop any oil or gas resources found under the land. Leases are subject to terms and conditions. These are restrictions derived from legal statutes and measures to minimize adverse impacts to other resources and are generally characterized in a lease as stipulations. Stipulations modify the rights the government grants to a lessee. The stipulations are known by potential lessees prior to any sale and must be applied at the time of Application for Permit to Drill (APD).

2.2.1. Standard Lease Terms

The Standard Lease Terms are contained in Form 3100-11, Offer to Lease and Lease for Oil and Gas, United States Department of the Interior, BLM, June 1988 (see Appendix A). The Standard Lease Terms provide the lessee the right to use the leased land as needed to explore for, drill for, extract, remove and dispose of oil and gas deposits located under the leased lands. Operations must be conducted in a manner that minimizes adverse impacts to the land, air, water, cultural, biological, and visual elements of the environment, as well as other land uses or users. Federal environmental protection laws such as the *Clean Water Act*, *Endangered Species Act*, and *Historic Preservation Act*, will be applied to all lands and are included in the standard lease stipulations. If threatened or endangered species, objects of historic, cultural, or scientific value, or substantial unanticipated environmental effects are encountered during construction, all work affecting the resource will stop and the land management agency will be contacted. Surface-disturbing operations that would destroy or harm these species or objects are prohibited.

Standard Lease Terms provide for reasonable measures to minimize adverse impacts to surface resources. These include, but are not limited to, modifications to the siting or design of facilities, timing of operations, and specifications of interim and final reclamation measures. Standard Lease Terms may not require the lessee to relocate drilling rigs or supporting facilities by more than 200 meters (656 feet), require that operations be sited off the leasehold, or prohibit new surface-disturbing operations for more than 60 days each year (43 CFR 3101.1-2).

The lease requires that the lessee meet stipulation conditions or avoid activities within all, or an identified part, of the leasehold. All leases on National Forest System lands contain the "Stipulation for Lands of the National Forest System Under Jurisdiction of Department of Agriculture," requiring the lessee to comply with the rules and regulations of the Department of Agriculture. All leases are subject to regulations and formal orders of the Secretaries of the Interior and Agriculture in effect at the time of issuance.

2.2.2. Stipulations

The Standard Lease Terms can be modified by stipulations attached to the lease (43 CFR 3101.1-2 through 3101.1-4). Additional stipulations can be developed specifically to meet resource concerns that cannot be mitigated by existing stipulations. All stipulations that may be applied when implementing the Forest Supervisor's decisions are detailed in Appendix A. These include stipulations that incorporate management direction, standards and guidelines, and Appendix H as required and documented in the Humboldt Toiyabe National Forest Land and Resource Management Plan.

2.3. Federal Oil and Gas Leasing Processes

In 1987, Congress passed the *Federal Onshore Oil and Gas Leasing Reform Act* (P.L. 100-203). (referred to as the *Leasing Reform Act* throughout this document.) The *Leasing Reform Act* makes leasing on public domain lands very similar to that of acquired lands. It made two significant changes in the way leasing decisions are reached. First, the *Leasing Reform Act* expanded the role of the Secretary of Agriculture in the leasing decision process. The Secretary was authorized to identify the National Forest System lands for which leases could be sold.

Also, he or his officers were authorized to determine the appropriate stipulations to apply to a lease to protect the surface resources.

The *Leasing Reform Act* also established a statutory requirement for processing the Surface Use Plan of Operation (SUPO) prior to ground-disturbing activities. This established a staged decision process for sale of a lease and approval of a permit to drill and operate. That is, before a company can drill an exploratory well or extract oil or gas from National Forest System lands, the Forest Service must first authorize sale of a lease, and then must approve or disapprove a detailed SUPO at the time of an APD. The lease decision is based on, among other things, an environmental analysis in accord with the requirements of the *National Environmental Policy Act* (NEPA) (40 CFR part 1502) that identifies stipulations needed to protect the environment. The approval of drilling also is based on an environmental analysis in accord with NEPA, which is specific to the proposed plan of operation.

2.3.1. The Regulations Implementing the *Leasing Reform Act*

The *Leasing Reform Act* modified the authorities of the Secretaries of the Interior and Agriculture and established the foundation for staged decision-making, but the procedures to be used were defined in implementing regulations. The Forest Service developed those regulations over a two-year period and published the "Final Rule" in the Final Register on March 21, 1990 (36 Code of Federal Regulations, Part 228, 100 et. seq.; 55 FR 10423).

In the implementing regulations, the Secretaries of Agriculture and Interior have caused the leasing decision to be made based on a level of information appropriate to the speculative nature of oil and gas exploration. The text of the 36 CFR 228 Subpart E – Oil and Gas Resources regulations that describes this decision process is as follows:

228.102 (c) - Leasing Analyses:

As part of the leasing analysis, the authorized Forest officer shall:

Identify on maps those areas that will be:

Open to development subject to the terms and conditions of the standard oil and gas lease form (including an explanation of the typical standards and objectives to be enforced under the Standard Lease Terms);

Open to development but subject to constraints that will require the use of lease stipulations such as those prohibiting surface use on areas larger than 40 acres or such other standards as may be developed in the plan for stipulation use (with discussion as to why the constraints are necessary and justifiable) and;

Closed to leasing, distinguishing between those areas that are being closed through exercise of management direction, and those closed by law, regulation, etc.

Identify alternatives to the areas listed in paragraph (c) (1) of this section including that of not allowing leasing.

Project the type/amount of post-leasing activity that is reasonably foreseeable as a consequence of conducting a leasing program consistent with that described in the proposal and for each alternative.

Analyze the Reasonably Foreseeable impacts of post-leasing activity projected under paragraph (c)(3) of this section.

228.102 (d) - Area or Forest-wide Leasing Decisions (Lands Administratively Available For Leasing)

Upon completion of the leasing analysis, the Forest Supervisor [as designated by the Regional Forester] shall promptly notify the Bureau of Land Management as to the area or Forest-wide leasing decisions that have been made, that is, identify lands which have available for leasing.

228.102 (e) - Leasing Decisions for Specific Lands

At such time as specific lands are being considered for leasing, the Forest Supervisor shall review the area or Forest-wide leasing decision and shall authorize the BLM to offer specific lands for lease subject to:

Verifying that oil and gas leasing on the specific lands has been adequately addressed in a NEPA document, and is consistent with the Forest Land and Resource Management Plan.

Ensuring that conditions of surface occupancy identified in section 228.102(c)(1) are properly included as stipulations in resulting leases.

Determining that operations and development could be allowed somewhere on each proposed lease, except where stipulations will prohibit all surface occupancy.

(36 Code Of Federal Regulations, part 228.102 Leasing Analysis and Decisions)

3. THE “STAGED” DECISION PROCESS

The legally required, staged-decision process set out in 36 CFR 228.102 is designed to accommodate the tentative nature of oil and gas exploration and development. In general, the various steps undertaken are as follows: (1) Forest Service leasing analysis; (2) Forest Service notification to Bureau of Land Management (BLM) of lands administratively available for leasing; (3) Forest Service review and verification of BLM leasing proposals; (4) BLM assessment of Forest Service conditions of surface occupancy; (5) BLM offers lease; (6) BLM issues lease; (7) Forest Service review and approval of lessee's SUPO; and (8) BLM review and approval of lessee's application for permit to drill (APD). Exploration for oil and gas resources is costly and speculative. Firms must commit costly equipment, purchase a variety of land rights and use expensive environmental protection technologies to begin exploration for oil or gas. Driven by pressures to be efficient and minimize risk, the nature of the enterprise has evolved over decades into a form in which exploration and development requires long-term planning by many loosely associated, mutually dependent industries. There is no guarantee that the expensive commitment of exploratory resources will result in a discovery of oil or gas as only

about 15 percent of exploratory wells drilled in the United States result in a paying discovery of oil or gas.

Consequently, companies or individuals pursuing oil and gas must be able to plan in advance to most efficiently use their exploratory resources. One tactic they rely on to stage commitments of their own resources is the purchase of public land leases. Developers want to know what lands are available for exploration and development and they want to be assured of continued future opportunities. Leasing of public lands is a way to do this.

However those purchasing leases do not automatically or immediately drill exploratory wells on these leaseholds. In any given time period, exploration firms must match geologic characteristics with the commitment of technology, capital, available equipment, and market conditions in a decision to risk a drilling operation. As a result, federal land lease are bought, relinquished, expire, and may be bought and sold again many times without ever being drilled upon. This demonstrates a major distinction between oil and gas leasing and other activities that are authorized by the Forest Service. Most activities are reasonably certain to proceed to development authorized by the Forest Service. Most activities are reasonably certain to proceed to development after the permit or contract is issued. Even though there is great uncertainty at the time of lease authorization as to whether a well will be drilled and, if so, when and where, the effects of a typical well in a given location can be estimated reliably on the basis of past experience.

The federal government wants to respond to industry concerns, but must ensure that future activities will neither unduly harm the environment nor unduly interfere with other uses of these public lands. A regulatory framework has been created to meet industry's needs while protecting other resources. The regulations include staged permitting of oil and gas exploration and development. Those stages include public disclosure at the following decision points: (1) the determination of lands available for leasing, (2) the leasing specific lands decision, (3) Application for Permit to Drill, and (4) analysis of field development if production is established. The staged process is designed to minimize the risk of making a decision that could lead to undisclosed irreversible or irrevocable environmental impacts. Each decision is based on environmental analysis and disclosure of the probable effects in accord with NEPA. Each decision is appealable to the responsible federal agency.

The United States Supreme Court in *Robertson v. Methow Valley Citizens Council*, 104 L.Ed.2d 351 (1989), upheld the use of more than one stage of NEPA compliance after a Forest Plan is issued. In the Methow Valley situation, there was a permit stage (which allowed no ground-disturbing activities) and a faster development plan stage that involved another NEPA process and decision by the government before environmental effects would be experienced. This is very similar to the situation that is involved here.

APPENDIX G:

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APPENDIX H:

**SPECIAL STIPULATIONS FOR
FOREST SERVICE MINERAL LEASES**

FROM THE

***HUMBOLDT NATIONAL FOREST
LAND AND RESOURCE
MANAGEMENT PLAN – APPENDIX H***

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Humboldt National Forest Land and Resource Management Plan Appendix H

SPECIAL STIPULATIONS FOR FOREST SERVICE MINERAL LEASES

The following special stipulations are in addition to the lease terms and standard stipulations (forms 3109-5, 3109-3, and Forest Service supplement to 3109-3), and are necessary to protect specific resource values on the lease area. If found to be in the public interest, these stipulations may be made less restrictive when specifically approved in writing by the District Engineer, Geological Survey (GS), and the authorized officer of the Federal surface management agency.

1. All of the land in this lease is included in (recreation or special area, ect.). Therefore, no occupancy or disturbance of the surface of the land described in this lease is authorized. The lessee, however, may exploit the oil and gas resources in this lease by directional drilling from sites outside this lease. If a proposed drilling site lies on land administered by the Bureau of Land Management, or by the Forest Service, a permit for use of the site must be obtained from the BLM District Manager or the Forest Service District Ranger, before drilling or other development begins. (Note: Use of stipulation requires GS concurrence.)
2. No access or work trail or road, earth cut or fill, structure or other improvement, other than an active drilling rig, will be permitted if it can be viewed from the (road, lake, river, etc.). (Note: Use of stipulation requires GS concurrence.).
3. No occupancy or other activity on the surface of (legal subdivision) is allowed under this lease.
4. No occupancy or other surface disturbance will be allowed within _____ feet of the _____ (road, trail, river, creek, canal, etc.). This distance may be modified when specifically approved in writing by the District Engineer of the Geological Survey, with the concurrence of the authorized officer of the Federal surface management agency.
5. No drilling or storage facilities will be allowed within _____ feet of (live water, the reservoir, the archaeological site, the historical site, the paleontological site, etc.) located in (legal subdivision). This distance may be modified when specifically approved in writing by the District Engineer of the U.S. Geological Survey, with the concurrence of the authorized officer of the Federal surface management agency.
6. No occupancy or other surface disturbance will be allowed on slopes in excess of _____ percent, without written permission from the District Engineer of the U.S. Geological Survey, with the concurrence of the authorized officer of the Federal surface management agency.
7. In order to (minimize watershed damage, protect important seasonal wildlife habitat, etc.)

exploration, drilling, and other development activity will be allowed only (during the period from ____ to ____, during dry soil period, over a snow cover, on frozen ground). This limitation does not apply to maintenance and operation of producing wells. Exceptions to this limitation in any year may be specifically authorized in writing by the District Engineer of the U.S. Geological Survey, with the concurrence of the authorized officer of the Federal surface management agency.

8. In order to minimize watershed damage, during muddy and/or wet periods, the authorized officer of the Federal surface management agency, through the District Engineer of the U.S. Geological Survey, may prohibit exploration, drilling, or other development. This limitation does not apply to maintenance and operation of producing wells.
9. The ____ (Trail/Road) will not be used as an access road for activities on this lease, except as follows: (No exceptions, weekdays during recreation season, etc.).
10. To maintain esthetic values, all semi-permanent and permanent facilities may require painting or camouflage to blend with the natural surroundings. The paint selection or method of camouflage will be subject to approval by the District Engineer of the Geological Survey, with the concurrence of the authorized officer of the Federal surface management agency.
11. No occupancy or other activity on the surface of the following described lands is allowed under this lease:

Reasons for this restriction are:

Examples of appropriate reasons for this restriction are:

1. Steep slopes.
2. Specific ecosystems, ecological land unit, land type of geologic formation which presents hazards such as mass failure.
3. Roadless or essentially roadless area (includes Chevron and Rainbow stipulations).
4. Special management units such as: Recreation Type I, water supply, administrative site, etc.

() Approximately % of lease

Note: This stipulation could be used in place of stipulations Nos. 1, 3, and 6.

12. No ____ will be allowed within ____ feet of the _____. This area contains _____ acres and is described as follows:

Reasons:

First blank to be filled in with one or more of the following: drilling, storage, facilities, surface disturbance, or occupancy. Second and third blanks to be filled in

with one or more of the following:

1. _____ feet wildlife habitat essential to specific species.
2. _____ feet peripheral or unique vegetation type.
3. 200 feet either side of centerline of roads or highways.
4. 500 feet of normal high waterline on all streams, rivers, ponds, reservoirs, or lakes.
5. 600 feet of all springs.
6. 400 feet of any improvements.

Note: Stipulation no. 12 could be used in place of stipulation numbers 4 and 5 to eliminate that line.

13. In order to (minimize) (protect) _____, _____ will be allowed only during _____. This does not apply to maintenance and operation of producing wells and facilities. Lands within leased area to which this stipulation applies are described as follows:

Reasons:

First blank to be filled in with one or more of the following:

1. Watershed damage.
2. Soil erosion.
3. Seasonal wildlife habitat (winter range, calving/lambing area, etc.).
4. Conflict with recreation.

Second blank to be filled in with one or more of the following:

5. Surface disturbing activities.
6. Exploration.
7. Drilling.
8. Development.

Third blank to be filled in with one or more of the following:

9. Period from _____ to _____.
10. Dry soil periods.
11. Over the snow.
12. Frozen ground.

Note: Stipulation No. 13 could be used in place of stipulation no.7, giving greater definition as to restriction.

14. Controlled or Limited Surface Stipulation. This stipulation may be modified when specifically approved in writing by the District Engineer, Geological Survey, with concurrence of the Federal surface management agency. Distances and/or time periods

may be made less restrictive depending on the actual on ground conditions.

The lessee/operator' is given notice that all or portions of the lease area may contain special values, may be needed for special purposes, or may require special attention to prevent damage to surface and/or other resources. Any surface use or occupancy within such special areas will be strictly controlled or, if necessary, excluded. Use or occupancy will be authorized only when the lessee/operator demonstrates that the special area is essential for operations in accordance with a surface use and operations plan which is satisfactory to the Geological survey and the Federal surface management agency for the protection of such special areas and existing or planned uses. Appropriate modifications to imposed restrictions will be made for the maintenance and operation of producing oil and gas wells; however, in extremely critical situations, occupancy may only be allowed in emergencies.

After the Federal surface management agency has been advised of specific proposed surface use or occupancy on these lands, and on request of the lessee/operator, the agency will furnish more specific locations and additional information on such special areas which now include:

(Legal land description to lot and/or quarter', quarter section.)

Reason for Restriction:

Duration of Restriction: (year-round, month(s)).

15. Activity Coordination Stipulation. This lease includes lands within _____* which has resource values sensitive to high levels of activity. In order to minimize impacts to these resources, special conditions, such as unitization prior to approval of operations, and/or other limitations to spread surface disturbance activities over time and space may be required prior to approval and commencement of any operations on the lease.

*Wilderness Areas, Further Planning Areas, Areas of Threatened and Endangered Species.

16. Protection of Endangered or Threatened Species. The Federal surface Management Agency is responsible for assuring that the area to be disturbed is examined, prior to undertaking any surface-disturbing activities on lands covered by this lease, to determine effects upon any plant or animal species listed or proposed for listing as endangered or threatened, or their habitats. If the findings of this examination determine that the operation may detrimentally affect an endangered or threatened species, some restrictions to the operator's plans or even disallowances of use may result.

The lessee/operator may, at his discretion and cost, conduct the examination on the lands to be disturbed. This examination must be done by or under the supervision of a qualified resource specialist approved by the surface management agency. An acceptable report must be provided to the surface management agency identifying the anticipated effects of the proposed action on endangered or threatened species or their habitat.

TABLE H-1
SPECIAL STIPULATIONS FOR MINERAL LEASES

U.S. Forest Service Standard Stipulations	High use recreation area	Steep slopes	Riparian areas	Key wildlife Habitat	T&E Habitat	Administrative Sites	Research natural areas	Cultural resources	Municipal (culinary) Watersheds	Scenic Areas	Significant Primitive Values	Ecological Areas	Unstable Soils
1. No occupancy/disturbance for [rec./special area/etc.]*	X									X			
2. No facilities viewed from [road/lake/etc.]*										X			
3. No surface occupancy		X	X			X	X		X				
4. No occupancy/disturbance within [] feet of [rd./tr./creek/etc.]*	X		X	X							X		
5. No drilling/facilities within [] feet of [live water/archeological/etc.]*	X		X	X				X	X		X		
6. No occupancy/disturbance, steep slopes		X											
7. Exploration/ development allowed [specific time/over snow/etc.]*				X									X

*TO BE COMPLETED WHEN LEASE IS ISSUED.



**TABLE H-1
SPECIAL STIPULATIONS FOR MINERAL LEASES (CONTINUED)**

U.S. Forest Service Standard Stipulations	High use recreation area	Steep slopes	Riparian areas	Key wildlife Habitat	T&E Habitat	Administrative Sites	Research natural areas	Cultural resources	Municipal (culinary) Watersheds	Scenic Areas	Significant Primitive Values	Ecological Areas	Unstable Soils
8. Prohibit exploration development for watershed damage									X				
9. Limits use of roads/trails	X									X			
10. Esthetic painting of buildings													
11. No occupancy/activity for [steep slope/ ecosystem/etc.]*													
12. No [state activity] allowed because of [wildlife/imprint/etc.]*	X		X	X	X				X		X		
13. To protect [state activity] allow [type of activity] during [state time period]*	X			X					X	X			X
14. Controlled/limited surface use	X						X	X	X	X	X	X	
15. Activity coordination	X			X	X		X	X	X	X			
16. Protect T&E species					X								



APPENDIX I:

GLOSSARY

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Abandonment: Termination of operation for production from a well. Permanent abandonment involves plugging the well and removal of installations.

Alluvial Fans: A fan-shaped deposit of sand, gravel, and fine material from a stream where its gradient lessens abruptly.

Animal Unit Months (AUMs): The amount of forage necessary to sustain one cow and one calf or its equivalent for one month.

Application for Permit to Drill (APD): An application to drill a well submitted by a lessee or operator to the BLM. The APD consists of a Drilling Plan that discusses downhole specifications and procedures (reviewed by the BLM) and a Surface Use Plan of Operations (SUPO) that examines surface uses, including access roads, well site layout, cut and fill diagrams, reclamation procedures, production facility locations, etc. (reviewed by the Forest Service). The approved APD is a contract between the operator and the federal government and cannot be changed or modified unless authorized by the BLM and the Forest Service.

Aquifer: A layer of material that contains water; the part of a water-drive reservoir that contains the aquifer.

Biodiversity: The diversity or numbers of species that collectively represent the living plants and animals within a local, regional, or continental landscape.

Bureau of Land Management: The Department of the Interior agency responsible for managing most federal government subsurface minerals. It has surface management responsibility for federal lands designated under the Federal Land Policy and Management Act of 1976.

Condition of Approval (COA): Conditions or provisions (requirements) under which an Application for a Permit to Drill or a sundry Notice is approved.

Controlled Surface Use (CSU): A stipulation attached to a lease that allows use and occupancy (unless restricted by another stipulation) with identified resource values requiring special operational constraints that may modify the lease rights. CSU is used as an operating guideline, not as a substitute for No Surface Occupancy (NSO) or Timing Lease (TL) stipulations.

Critical Habitat: Specific areas within a geographical area occupied by a threatened or endangered species on which are found those physical and biological features (1) essential to the conservation of the species and (2) which may require special management considerations or protection. Critical habitat shall not include the entire geographic area which can be occupied by the threatened and endangered species.

Critical Winter Range: The area available to and used by big game (large mammals normally managed for sport hunting) during the winter months which generally provide high quality forage, security, and lack of disturbance.

Cumulative Effects Analysis: The analysis of impact on the environment which results from the incremental impact of an action when added to other past, present, and reasonably

foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time.

Development Well: A well drilled in proven (oil and/or gas) territory (usually within one mile of an existing well).

Directional Drilling: The intentional deviation of a wellbore from vertical to reach subsurface areas off to one side from the drilling site.

Diversity: (1) The relative abundance of wildlife species, plant species, communities, habitats, or habitat features per unit of area; (2) The distribution and abundance of different plant and animal communities and species within the area covered by a Land and Resource Management Plan (36 CFR Part 219.3(g)).

Ecosystem: All organisms in a community plus the associated abiotic environmental factors.

Ecotonal Areas: A transition zone or strip of vegetation between two communities which has characteristics of both kinds of neighboring vegetation as well as characteristics of its own.

Endangered Species: Any species that is in danger of extinction throughout all or a significant portion of its range, other than a species of the Class Insecta determined by the Secretary to constitute a pest whose protection under the Endangered Species Act would present an overwhelming and overriding risk to man.

Enhancement: A short-term management alternative that is completed with the express purpose of increasing positive visual variety where little variety now exists.

Ephemeral: Refers to short-lived existence.

Erosion: The wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep.

Fault: A fracture or fracture zone along which there has been displacement of the sides relative to one another parallel to the fracture.

Floodplain: The lowland and relatively flat area adjoining inland waters, including at a minimum, that subject to a one percent or greater chance of flooding in any given year.

Fold: A curve or bend of a planar structure such as rock strata, bedding planes, foliation, or cleavage. A fold is usually a product of deformation, although its definition is descriptive and not genetic and may include primary structures.

Forage: All browse and herbaceous foods that are available to grazing animals.

Forb: An herbaceous plant that is not a grass nor grasslike (such as a sedge), e.g., sunflower, geranium.

Geomorphic: Of, or pertaining to, the figure of the earth or the form of its surface.

Gullying: Removal of soil by running water, with formation of channels that cannot be smoothed out completely by normal cultivation.

Habitat: A specific set of physical conditions that surround a single species, a group of species, or a large community. In wildlife management, the major components of habitat are considered to be food, water, cover, and living space.

Hydrocarbon: Any organic compound, gaseous, liquid, or solid, consisting solely of carbon and hydrogen.

Leasable Public Domain: Those minerals or materials on public lands designated as leasable under Minerals the Mineral Leasing Act of 1920. Included are coal, phosphate, asphalt, sulphur, potassium, sodium minerals, and oil and gas.

Lease: (1) A legal contract that provides for the right to develop and produce oil and gas resources for a specific period of time under certain agreed-upon terms and conditions. (2) The tract of land on that a lease has been obtained, where producing wells and production equipment are located.

Lease Notices: A notice attached to a lease that provides more detailed information concerning limitations that already exist in law, lease terms, regulations, or operations orders. A Lease Notice also addresses special items the lessee would need to consider when planning operations, but does not impose new or additional restrictions.

Lease Bond: A determined amount of money furnished by an operator prior to any surface-disturbing activities related to drilling to ensure compliance with all lease terms, including protection of the environment.

Lease Stipulations: Additional specific terms and conditions that change the manner in which an operation may be conducted on a lease, or modify the lease rights granted.

Lek: Traditional sage grouse strutting/breeding grounds.

Lithic Scatters: Archeological site showing evidence of stone tool manufacture, resource procurement and processing, and possible short-term camping.

Management Indicator Species: Those wildlife species selected in the planning process to monitor the effects of planned management activities of viable populations of all wildlife and fish species including those species that are socially or economically important.

Mass Wasting: General term for a variety of processes by which large masses of earth material are moved by gravity either slowly or quickly from one place to another (Trowbridge 1962).

Maximum Modification (VQO): Human activity may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background.

Migratory Species: Those species having a tendency to migrate to and from feeding or reproductive and nesting areas.

Mineral Rights: Under the law of the United States, mineral rights do not go with the land. Some fee land does not have mineral rights, those rights being retained by the government. Fee land that originally had the mineral rights can be sold separately from the mineral rights and vice versa.

Mitigation: Includes: (1) Avoiding an impact altogether by not taking a certain action or parts of an action; (2) Minimizing an impact by limiting the degree of magnitude of the action and its implementation; (3) Rectifying an impact of repairing, rehabilitating, or restoring the affected environment; (4) Reducing or eliminating an impact over time by preservation and maintenance operations during the life of the action; (5) Compensating for an impact by replacing or providing substitute resources or environments.

Modification (VQO): Human activity may dominate the characteristic landscape, but must, at the same time, use naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in middle-ground or background.

National Environmental Policy Act of 1969 (NEPA) Public Law 91-190.: Establishes environmental policy for the nation. Among other items, NEPA requires federal agencies to consider environmental values in decision-making processes.

National Forest Management Act: A law passed in 1976 as an amendment to the Forest and Rangeland Renewable Resources Planning Act that requires the preparation of Regional and Forest plans and the preparation of regulations to guide that development.

National Forest System: All National Forest System lands reserved or withdrawn from the public domain of the United States; all National Forest System lands acquired through purchase, exchange, donation, or other means; the National Grasslands and land use projects administered under Title III of the Bankhead-Jones Farm Tenant Act (7 U.S.C. 1010 et seq.); and other lands, waters, or interests therein which are administered by the Forest Service or are designated for administration through the Forest Service as a part of the system (16 U.S.C 1609).

No Surface Occupancy (NSO): A fluid mineral stipulation attached to a lease that prohibits occupancy on all or part of the land surface to protect special values or users. The NSO stipulation includes stipulations that may have been worded as "No Surface Use/Occupancy", "No Surface Disturbance", "Conditional NSO", and "Surface Disturbance and Surface Occupancy Restriction by Location". Lessees may use the oil and gas geothermal resources under leases restricted by this stipulation through use of directional drilling from sites outside the NSO area.

Off Lease: Refers to only those lands not within the particular operator's lease. May include other lease areas.

On Lease: Refers to those lands under the operator's lease.

Palustrine (Wetlands): Growing in or inhabiting marshes.

Partial Retention (VQO): Human activities may be evident, but must remain subordinate to the characteristic landscape.

Play: A subsurface area that has been defined by a geologist or geophysicist that potentially has economically recoverable hydrocarbons.

Preservation: In general, human activities are not detectable to the visitor.

Reclamation: Returning disturbed lands to a form and productivity that will be ecologically balanced and in conformity with a predetermined land management plan.

Recreation Opportunity: Land delineations that identify a variety of recreation Spectrum (ROS) experience opportunities in six classes along a continuum from primitive to urban. Each class is defined in terms of natural resource settings, activities, and experience opportunities. The six classes are: Urban, Rural, Roaded Natural, Semiprimitive Motorized, Semiprimitive Nonmotorized, and Primitive.

Research Natural Area: An area in as near a natural condition as possible, that exemplifies typical or unique vegetation and associated biotic, soil, geologic, and aquatic features. The area is set aside to preserve a representative sample of an ecological community primarily for the scientific and educational purposes; commercial and general public are not allowed.

Retention (VQO): Human activities are not evident to the casual forest visitor.

Revegetation: The reestablishment and development of self-sustaining plant cover. On disturbed sites, this normally requires human assistance such as seed bed preparation, reseeding, and mulching.

Riparian: Riparian areas consist of terrestrial and aquatic ecosystems; those lands in a position to directly influence water quality and water resources, whether or not free water is available. This would include all lands in the active flood channel and lands immediately upslope of stream banks. These areas may be associated with lakes, reservoirs, estuaries, potholes, marshes, streams, bogs, wet meadows, and intermittent or permanent streams where free and unbound water is available.

Scoping: An early and open public participation process for determining particular issues to be addressed in an environmental document and for identifying the significant issues related to a proposed action.

Sedimentation: That portion of the metamorphic cycle from the separation of the particles from the parent rock, no matter what its origin or constitution, to and including their consolidation into another rock.

Sensitive Species: Those plant or animal species that are susceptible or vulnerable to activity impacts or habitat alterations; generally listed as sensitive by a governmental agency or other organization.

Sixth Code Watershed: The sixth, and smallest, level of classification in the hierarchy of hydrologic units, also referred to as sub-watersheds. The drainage area is typically 10,000 to 40,000 acres and discharge is at a single point. 12 digit numbers are used to catalogue subwatersheds.

Split Estate Lands: Lands on which the surface ownership is different from the subsurface (mineral) ownership.

Stipulation: A provision that modifies standard lease rights and is attached to and made a part of the lease.

Strata: Sections of a formation that consist throughout of approximately the same kind of rock material.

Stratigraphic Traps: A type of trap which results from variation in lithology of the reservoir rock and a termination of the reservoir (usually on the updip extension) or other interruption of continuity.

Strutting Grounds: Areas used by sage grouse for displays during the mating season.

Threatened Species: Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Timing Limitation (TL): A stipulation attached to a lease that prohibits surface use during specified time periods to protect identified resource values. The stipulation does not apply to the operation and maintenance of production facilities unless the findings of analysis demonstrate the continued need for such mitigation and that less stringent, project-specific mitigation measures would be insufficient.

Understory Species: That portion of a plant community growing underneath the taller plants on the site.

Visual Quality Objectives: A set of standards or goals for the visual management of the landscape assigned to units of land. VQOs are based upon variety class, sensitivity, level, and distance zone determinations. Each objective describes a different level of acceptable alteration based on aesthetic importance. The degree of alteration is based on contrast with the surrounding landscape. There are four objectives: Retention, Partial Retention, Modification, and Maximum Modification.

Visual Resource: The composite of basic terrain, geologic features, water features, vegetative patterns, and land use effects that typify a land unit and influence the visual appeal of the unit.

Watershed: The total area of land above a given point on a waterway that contributes run-off water to the flow at that point; a major subdivision of a drainage basin.

Wetlands: Lands where saturation with water is the primary factor determining the nature of soil development and the kinds of animal and plant communities living under or on its surface.

APPENDIX J:

PUBLIC COMMENT AND AGENCY RESPONSE

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1. INTRODUCTION

This appendix summarizes and responds to comments received on the Draft Environmental Impact Statement (DEIS). Approximately 1,800 replies were received during the 45-day comment period. All comments received were read, grouped according to subject matter, and then consolidated into "Public Concerns." Sub-concerns follow Public Concerns to provide additional detail. Sample Statements, which are exact quotes from comment letters, are often provided to show examples of public comment. The Agency Response is then provided to each grouped Public Concern. All of the comments received are provided in their entirety within the project record. (*Note: Public Concerns appear out of their original order due to grouping.*)

2. PUBLIC CONCERNS AND AGENCY RESPONSES

2.1. Alternatives Development/Alternative Selection

Public Concern #3: *The Forest Service should choose the least restrictive Alternative 4.*

Sub-concerns:

- #1: To encourage the search for additional energy sources.
- #2: Alternative 4 provides adequate resource protection.
- #3: It is consistent with the Forest Service's mission to support energy exploration and development.

Sample Statements:

- #1: "The Forest Service can meet their stated mission while acting responsibly within the bounds of Environmental protection. Please adopt Alternative 4 as your course of action." (#45-3)
- #2: "Alternative 4 is necessary so that we can encourage, not discourage, the search for additional energy sources." (#49-1)

Agency Response: The EIS covers a range of alternatives, one of which is Alternative 4. The deciding officer will consider all alternatives and public comments and opinions before making a decision. The Forest Service National Mineral Policy objective states the Forest Service will administer its minerals program to provide commodities for current and future generations commensurate with the need to sustain the long-term health and biological diversity of ecosystems. This includes ensuring exploration, development, and production of mineral and energy resources are conducted in an environmentally sensitive manner and that these activities are integrated with the planning and management of other resources using the principles of ecosystem management.

Public Concern #13: *The Forest Service should clarify if avoidance measures apply to both exploration and full-field development.*

Sample Statement:

#1: "As we read the various chapters of the DEIS, it is hard to understand if avoidance measures under various alternatives would occur in relation to exploration activities, or only to full-scale development of O/G wells and other facilities." (#10-4)

Agency Response: Section 5 of Chapter 2 in the FEIS has been revised to clarify that avoidance measures apply to both exploration and development activities.

Public Concern #20: *The Forest Service should not allow waivers, exceptions, or modifications to any of the stipulations.*

Sub-concern:

#1): To protect sensitive resource components.

Sample Statements:

#1: "We urge the FS to make the lease stipulations strong and unwaivable. If you allow the authorized officer to waive stipulations in the course of drilling operations, it undermines all the care and thought given to environmental protection earlier in the process." (#43-3)

#2: "Additionally, you must not allow any waivers on lease stipulations. Waivers can only result in further damage to the land and thus cause irreparable harm to these special places. Allowing such waivers would eliminate any protection identified in the lease stipulations." (#82-4)

Agency Response: Section 5 of Chapter 2 in the FEIS has been revised to discuss the use of waivers, exceptions, and modifications. Additional information is also contained in Appendix A of the FEIS. Allowances for the use of waivers, exceptions, or modifications is consistent with Forest Service regulations at 36 CFR 228.104: "Consideration of requests to modify, waive, or grant exceptions to lease stipulations." The determination to use waivers, exceptions, or modifications to stipulations would be made by the Forest Service at the project level and take into account site-specific information. Approval of changes to lease stipulations would ensure that "The management objectives which led the Forest Service to require the inclusion of the stipulation in the lease can be met without restricting operations in the manner provided for by the stipulation."

Public Concern # 21: *The Forest Service should consider a broader range of alternatives in the EIS.*

Sub-concern:

#1: To protect sensitive resource components including roadless characteristics, wildlife, and special status species.

#2: To include restoration activities.

Sample Statements:

#1: "Consider a far broader range of alternative actions in this EIS – such as: No leasing in lands or where water is at a premium, or aquifer sources are already overburdened; no leasing in lands of important MIS species, sage grouse, cultural or other very high value to the public and similar measures; identification of ecologically important areas and complete avoidance of activities there." (#10-1)

#2: "A full suite of restoration actions for damaged, degraded or diverted riparian areas must be assessed under all alternatives – including an array of passive treatments, such as stubble heights, rest to jump start recovery, or until recovery, then limited, if any grazing." (#10-10)

Agency Response: The FEIS describes and fully evaluates four reasonable alternatives that include No Action/No Lease and three action alternatives offering variable levels of resource protection. Two additional alternatives, considered but not evaluated in detail, expanded the range of proposals and potential impacts by excluding all surface occupancy (Alternative 5) and limiting environmental protections to those addressed in standard lease terms, unless otherwise protected by law (Alternative 6). These latter alternatives were not fully evaluated because they "were not realistic or substantially different than the No Action Alternative or Forest Plan Alternative" (see FEIS, chapter 2, Sections 5,6, and 7).

An alternative that focuses on restoration would not meet the purpose and need for action and is therefore outside the scope of this analysis.

Public Concern # 22: *The Forest Service should ensure that all mitigation and monitoring measures (lease stipulations, etc.) tied to on-lease activities are also applied to off-lease activities.*

Sample Statements:

#1: "EPA strongly recommends that lease authorizations stipulate that all mitigation and monitoring requirements be applied to all lease-associated facilities on the Humboldt-Toiyabe National Forest, regardless of whether they are on or outside of leased parcels. The Final EIS and ROD should clarify that all lease stipulations to protect streams, floodplains. Springs, ponds, wet meadows, and riparian areas apply to all lease-associated activities and facilities, both on and outside of leased parcels. The Final EIS should estimate the environmental benefits of mitigation and monitoring requirements on all lease-associated sites." (#89-5)

Agency Response: See Section 5 of chapter 2 in this FEIS for a discussion on when lease stipulations apply to exploration and development activities. BLM and Forest Service leasing regulations do not allow lease stipulations to be applied to activities such as powerlines and pipelines, that are not authorized by the lease. Resource protection for these types of projects on National Forest System lands would be covered by the Forest Plan standards and guidelines in place at the time the specific activity is analyzed and approved under the authority of the Forest Service special use regulations at 36 CFR 251 Subpart B. It is anticipated that the level of protection and type of mitigation prescribed for rights-of-way projects would be similar to that detailed in the stipulations for leasing activities.

Public Concern #29: *The Forest Service should provide information on existing monitoring data and commit to monitoring affects of oil and gas activities.*

Sub-concerns:

#1: Monitoring should include facilities, springs, riparian, water quality, weeds, wildlife, cultural sites, and macroinvertebrates.

#2: Monitoring should be included in a lease stipulation.

Sample Statement:

#1: "The Final EIS should describe facility inspection and maintenance requirements, and requirements for monitoring water quality and habitat conditions during project activities. The Final EIS should discuss how these requirements will be applied during and after closure of exploration, construction, and production activities. The ROD should commit to these requirements as lease stipulations." (#89-2)

Agency Response: Existing data relevant to the issues has been presented in Chapter 3 of this FEIS. Specific monitoring in accordance with forest plan requirements will be developed at the site-specific project stage (providing detailed monitoring data at this point is outside the scope of the EIS). Assumptions about future monitoring have been added to the description of the Reasonably Foreseeable Development Scenario in Chapter 1 of the FEIS.

Public Concern #31: *The Forest Service should discuss best management practices for oil and gas activities and include them in the lease stipulations.*

Sample Statement:

#1: "The Final EIS should describe and discuss the best management practices that will be required for construction, maintenance, and restoration of drill sites, pipelines, and roads on all lands affected by lease authorization under each alternative. These best management practices should be applied to all roads and pipelines on the forest, which are associated with, but are not necessarily on, the authorized lease areas. The Forest Service should commit to these measures as lease stipulations in the Record of Decision (ROD). The Final EIS should estimate the environmental benefits of these best management practices. We recommend the Forest Service not allow disturbance in areas if, because of site specific conditions, best management practices cannot be successfully implemented or post-development restoration would not be successful." (#89-1)

Agency Response: The FS has committed to resource protection mitigation in section 5.5 page 2-47. Refer to the Reasonably Foreseeable Development Scenario in chapter 1 of the FEIS for resource protection assumptions. Mitigation will be developed on a site-specific project-level basis during future planning stages. At that time, resources and ground conditions will be evaluated and specialists will develop best management practices to apply to the permit. This approach allows for the best techniques to be applied to site-specific conditions. While many of these measures do not qualify as lease offering stipulations, the measures would be incorporated into the surface use plans and field development plans developed subsequent to leases being issued.

Public Concern #48: *The Forest Service should provide additional information on pollution prevention and hazardous material controls.*

Sub-concerns:

#1: Chemical compositions of products used during oil and gas activities should be disclosed and how they affect wildlife.

#2: How will wildlife be protected from open waste pits?

#3: What will be the effects of groundwater from oil spills?

#4: Lease stipulations should include spill prevention techniques.

#5: Lease stipulations should include measures to minimize air pollutants.

Sample Statements:

#1: "The U.S. Fish & Wildlife Service has identified wildlife mortality issues in relation to oil field waste pits on their website www.r6.fws.gov/contaminants. Birds and other wildlife attracted to the ponds become exposed to hydrocarbon which is often fatal. Even a light coating of oil on a bird's feathers can kill nestlings. Operators are required to either keep hydrocarbon waste in a closed containment system or they will need to permit with the Department of Wildlife and either cover or detoxify the ponds." (#12-20)

#2: "The Final EIS should include a summary of the pollution prevention opportunities described in EPA's document, and the ROD should commit to applying these techniques, as appropriate, on Conditions of Approval for lease agreements. The Final EIS should estimate the environmental benefits of mitigation and monitoring requirements on all lease-associated sites." (#89-6)

Agency Response: At the lands availability stage, detailed discussions on pollution prevention and hazardous materials control is not needed and is outside the scope of this EIS. Responses to each sub-concern are provided below.

Sub-concern #1: Listing all of the potential chemicals that may be used for drilling is outside the scope of the project and will be addressed at the site-specific APD stage.

Sub-concern #2: NDOW has the authority for regulating potentially hazardous open waste pit/ponds and would include appropriate mitigation measures at the time of permitting. The Forest Service would require fencing, netting, or other measures when physical hazards pose a risk to animals, especially birds. Development of this mitigation would occur during future planning stages (i.e., surface use plans and field development plans).

Sub-concern #3: Refer to FEIS Table 4-2, page 4-32 for a summary of possible groundwater mitigation by potential impact, mitigation, agency, and regulation.

Sub-concern #4: The Forest Service will add the EPA's referenced pollution prevention and mitigation measures to the project file and commit to consider these measures in future planning stages.

Sub-concern #5: All activities will comply with applicable Federal, state, and local laws and regulations regarding air quality. Project-specific mitigation will be identified in future planning stages. Surface use plans and field development plans would incorporate the required mitigation.

Public Concern #51: *The Forest Service needs to clarify how the 800 meter "distance" is applied to roadless areas and how it was chosen.*

Sample Statement:

#1: "We were unable to identify why 800 meters was chosen as the threshold for no surface occupancy (NSO) stipulations within IRAs. Further explanation is needed to understand that rationale." (#14-3)

Agency Response: The 800 meters was selected to allow for drilling outside of the roadless area boundary and allow for access to any oil reserves beneath roadless areas. The distance was determined to be reasonable based upon current drilling technology.

Public Concern #51: *The Forest Service should require a \$1 million for exploration drilling and a bond of several million for development activities.*

Sample Statement:

#1: "We ask that drilling companies post a \$1,000,000 bond in order to pay for all costs of reclamation of each road, drill pad, and any clean-up that may be necessary, and a bond of several million dollars for each well developed." (#10-41)

Agency Response: A discussion on bonding requirements is outside the scope of this EIS. Bonding is mandated by Forest Service and BLM regulations and is required for all projects with ground-disturbing activities at the project-level analysis stage. The amount of bonding will reflect current prices, site-specific ground conditions, and techniques to fully secure reclamation.

Public Concern #54: *The Forest Service should limit new development of infrastructure to existing corridors.*

Sample Statement:

#1: "The project should limit new development of infrastructure including power lines and roads to existing corridors. New development should be done in a focused manner in existing utility corridors." (#7-3)

Agency Response: Features Common to all Alternatives (FEIS Chapter 2) has been revised to assure that construction of new facilities such as powerlines, roads, and pipelines (to the extent practicable) would be constructed in existing corridors on sites in compliance with the Humboldt-Toiyabe Forest Plan. This would minimize new disturbances and limit environmental impacts. Utility routes would be identified and selected during future planning stages.

Public Concern #60: *The Forest Service should estimate the environmental benefits of mitigation and monitoring requirements on all lease-associated sites.*

Sample Statement:

#1: "The Final EIS should estimate the environmental benefits of mitigation and monitoring requirements on all lease-associated sites." (#89-5)

Agency Response: This comment would be appropriately addressed at future planning stages; discussion of the environmental benefits of mitigation and monitoring is outside the scope of this analysis.

2.2. Wildlife

Public Concern #8: *The Forest Service should protect Bighorn Sheep in all alternatives.*

Sub-concerns:

- #1: To protect the habitat, population, and genetic diversity.
- #2: Figure 3-5 Grant-Quinn Division–Bighorn Sheep Range underestimates the extent of Bighorn Sheep natural habitat.

Sample Statement:

- #1: “The Department has augmented bighorn sheep numbers in the White Pine Range with additional plans for an augmentation into the Grant Range. The purpose is to increase both population size and healthful genetic diversity. Bighorn sheep should be afforded the same protection in all alternatives similar to the format presented for Sage Grouse in the DEIS.” (#12-6)

Agency Response: Bighorn sheep are protected in all alternatives. Standard lease terms and lease stipulations specific to bighorn sheep are identified in Chapter 2. Alternative 2 requires NSO to “prevent disturbance to bighorn sheep range that could cause increased stress and displacement of animals.” Alternatives 3 and 4 impose controlled surface use (CSU) to “limit new surface disturbing activities within bighorn sheep range by designing facilities and developments to minimize loss of habitat and disturbance.” Bighorn sheep habitat (FEIS Figures 3-4 and 3-5) was delineated in coordination with NDOW Biologist Mike Podborny (Eureka). Bighorn sheep can be seen outside this area, but the area delineated as bighorn sheep habitat encompasses the most suitable habitat for bighorns.

Public Concern #27: *The Forest Service should provide information on how habitats for raptors, sage grouse and other special status and important species have been affected in the past.*

Sample Statement:

- #1: “How have these effects impacted habitats for raptors, sage grouse and other special status and important species?” (#10-25)

Agency Response: Existing habitat for wildlife species is described in FEIS Chapter 3, Ecological Integrity and Biological Diversity. In addition, cumulative effects resulting from the combination of past, present, and future actions are described in FEIS Chapter 4.

Public Concern #33: *The Forest Service should use information in the Greater Sage-Grouse Conservation Plan for Nevada and Eastern California to address sage grouse management.*

Sub-concerns:

- #1: This reference should be cited when used.
- #2: The buffer around leks should be increased to reflect the plan’s recommendations.

Sample Statements:

- #1: “DEIS sections addressing management considerations for Greater Sage-Grouse might better reflect the Forest Service’s anticipated commitment to the spirit and intent of Nevada’s Greater Sage-Grouse Conservation Plan for Nevada and Eastern California, and associated local Sub-Plans and guidelines. These references should be cited where appropriate (e.g., Sage-Grouse sections) in addressing contemporary conservation efforts demonstrative of heading off future listing of the Greater Sage-Grouse under the Federal Endangered Species Act of 1973, as amended.” (#12-1)

#2: "Sage Grouse — the preferred alternative identified NSO stipulations with a 3km radius around leks. What is that radius based on? A new field study (Halloran and Anderson, 2004) in Wyoming shows a 32% mean annual decline of male sage grouse at mating and courtship areas that are as much as 2 miles away from a drill rig." (#14-7)

Agency Response: The Forest Service has reviewed the Nevada Greater Sage-Grouse Conservation Plan and has incorporated the guidance where appropriate. We have also used other sources, including the Draft Resource Management Plan for the Ely District of the BLM (May 2006).

Public Concern #34: *Forest Service should include bats as a species group of concern and add cliffs and talus slopes as a sensitive resource component.*

Sub-concern:

#1: To protect bats and raptors in this habitat type.

Sample Statements:

#1: "The Department recommends adding bats as a species group of concern. The limestone outcrops and spring systems characteristic of the White Pine and Grant/Quinn Canyon ranges are very conducive to bats. More specifically, there are known populations of Townsend's Big-eared Bat in the Grant Range (Pat Brown, pers comm)." (#12-8)

#2: "Sensitive Resource Components: Add Cliff and Talus to this section as bats and nesting raptors are at least two wildlife kinds found in this habitat type". (#12-12)

Agency Response: Additional information has been added about the Townsend's big-eared and spotted bats (R4 Sensitive Species) in Chapter 3. Other bat species that may occur in the project area are covered when other wildlife species or habitat areas were analyzed in the EIS (such as within riparian buffers, raptor nesting, and/or mountain mahogany). Cliffs and talus slopes were not specifically identified and analyzed as issues or sensitive resource components because it is highly unlikely that oil and gas exploration or associated actions will occur within these areas. However, protection for these features is incorporated into "Standard Lease Terms and Lease Stipulations for Erosion Hazards." NSO of slopes >25% is mandated in Alternative 2 (FEIS Table 2-1); CSU of slopes 25-40% and NSO of slopes >40% in Alternative 3 (FEIS Table 2-2b); and CSU of slopes 25% in Alternative 4 (FEIS Table 2-3b). Should an application for drilling contain cliff and/or talus slopes within the project area, impacts to species utilizing these habitats (such as peregrine falcons, spotted bats, and Townsend's big-eared bats) would be analyzed at that time.

Public Concern #36: *The Forest Service should include additional migratory bird species from the Nevada Partners in Flight in the North American Land Bird Conservation Plan.*

Sample Statement:

#1: "Several species are omitted and many are not in the appropriate habitat type. All of the below are supported by the National Partners in Flight in the North American Land Bird Conservation Plan, some of which have been demonstrated to have population concerns range wide." (#12-11)

Agency Response: The FEIS has been modified to reflect habitat types identified in the Nevada Partners in Flight Bird Conservation Plan (Neel, 1999), the Partners in Flight North American Landbird Conservation Plan, and NDOW's Comprehensive Wildlife Conservation Strategy (CSWS) (see Table 3-1)

Public Concern #37: The Forest Service should clarify additional information on policies regarding sensitive species.

Sample Statement:

#1: "Excerpts from Chapter 3 of the Forest Service Manual would also clarify the requirements of the Forest Service to consider sensitive species. This would be of comparative value regarding other agency sensitive species lists and the policies and protections afforded." (#12-14)

Agency Response: The sensitive species that occur in the project area are listed in DEIS Table 3-1; a clarifying excerpt from the FS Manual is on DEIS page 3-7.

Public Concern #38: *The Forest Service should provide protection for migratory birds under Alternatives 3 and 4.*

Sub-concerns:

#1: To protect breeding and foraging habitats.

#2: Consider breeding survey information when addressing this issue.

Sample Statement:

#1: "Neotropical Migratory Birds: While the Forest Service may not have had opportunity to perform original surveys or research for this EIS effort, there is some data available at least for the presence and absence of species. The Department has conducted USGS facilitated breeding bird surveys, i.e. the Willis Route, in the Cherry Creek locale of the Quinn Canyon Range over the past decade. A species list and data summary are available on the USGS website at www.pwrc.usgs.gov/bbs. A species list was provided to the Ely District Ranger in July 2004 as part of the Department's scoping comments for this DEIS. Notable, is that Alternatives 3 & 4 do not provide adequate protections for neotropical migratory birds. Season of use, breeding and foraging habitats should be of strong consideration and well protected." (#12-17)

Agency Response: While no lease stipulations specific to neo-tropical migratory birds (NMB) are identified in Alternatives 3 and 4, the standard lease terms do provide a minimal level of protection. In addition, Alternatives 3 and 4 do include a NSO stipulation for riparian buffers (FEIS Tables 2-2b and 2-3b). As described in FEIS Chapter 4, section 1.4.2, riparian habitats "are often areas of concentration for NMB for nesting and foraging." Additional Alternative 3 protection for NMB would accrue from stipulations for sage grouse leks, nesting and early brood-rearing habitat, and summer habitat; raptor nesting buffers; elk and mule deer winter range; bighorn sheep habitat; mountain mahogany, aspen, sub-alpine habitats; roadless areas; "primitive" ROS; "retention" VQO (FEIS Tables 2-2b). Additional Alternative 4 protection for NMB would include stipulations for sage grouse leks, nesting and early brood rearing habitat, and summer habitat; bighorn sheep habitat; sub-alpine habitats; roadless areas; "primitive" ROS; "retention" VQO (FEIS Tables 2-3b).

Public Concern #39: *The Forest Service should also address mule deer summer and fawning habitat.***Sample Statement:**

#1: "The Forest Plan Proposed Action (Alternative 4) does not provide enough protection for mule deer and bighorn sheep in the planning area. The lack of protection for mule deer winter range in the Proposed Action and no mention of mule deer summer range in any of the alternatives will be detrimental for mule deer. All alternatives should include a section for mule deer fawning areas similar to that for elk calving areas. And, the same stipulations used for elk calving should be incorporated into a mule deer fawning area stipulation, but inclusive of springs and perennial streams attributes thereof." (#12-5)

Agency Response: Analysis determined that protection measures specific to mule deer summer range and fawning habitat were not necessary because protection for these areas are covered under other resource areas; the effects are displayed in Chapter 4 of the FEIS.

Summer range for mule deer is normally above 6,500 feet in elevation within both mountain ranges. Mule deer will fawn in many of the same habitats that elk calf. In the White Pine and Grant/Quinn Range they also move up into the mountain brush communities to fawn. The fawning is dispersed throughout much of this habitat; data is limited on fawning use within the mountain brush community. Within the White Pine Range all of the action alternatives have 82,880 acres of sage grouse nesting and early brood-rearing habitat with timing limitations from March 15 until July 15 when oil and gas activities would not allowed (FEIS page 4-5). About 74,060 acres of sage grouse summer range has CSU in which the amount of oil and gas activities within these areas would limited at any given time (FEIS 4-5). These two restrictions, along with the elk calving areas (FEIS page 4-11 and 12) and Wilderness (FEIS pages 4-33 and 34) offer protection for much of the deer fawning and summer habitat in both of these mountain ranges.

Public Concern #40: *The Forest Service should include the Nevada Species of Concern list.***Sample Statement:**

#1: "There is no State Species of Concern List presented in the DEIS. Some species of note, omitted from the document and may occur in the project area, include: Fringed Myotis, Pallid Bat, Brazilian Free-tailed Bat, Sonoran Mountain Kingsnake, Short horned Lizard, Western Mastiff Bat, Loggerhead Shrike, Sage Thrasher, Burrowing Owl, Yellow-breasted Chat and Brewer's Sparrow." (#12-9)

Agency Response: The EIS and accompanying project record addresses those species with legal mandates on National Forest System land. They include species listed by the USFWS as threatened, endangered, or candidates; species addressed in the Migratory Bird Species Act; "sensitive" species identified by the Forest Service Regional Forester (Region 4); and Management Indicator Species from the Forest Plan. Nevada's protected, threatened, and sensitive lists (Nevada Administrative Code 503) were reviewed and it was determined that these species were either covered under the above mentioned lists, did not occur within the project areas, or were not listed in Nevada Administrative Code 503.

Public Concern #41: *The Forest Service should consult with University of Nevada, Las Vegas and Nevada Department of Wildlife to acquire additional information on Flammulated Owls.*

Sample Statement:

#1: "The Department recommends consultation with Markus Mika (UNLV) and Jason Williams (Department Wildlife Diversity Biologist, Ely) regarding any recent records or predictive distribution of Flammulated Owls in the affected area. Recent surveys have been conducted in the project area and this owl has been recently observed in Grant-Quinn Range. Season of use and protections of riparian and nesting habitats will be of crucial importance for this species." (#12-10)

Agency Response: The status report was posted on Markus Mika's website in March 2006. The report has been reviewed and appropriate information included in FEIS. The "status report" can be found in the project record.

Public Concern #42: *The Forest Service should correct their information on page 4-6 regarding the affects to raptors.*

Sample Statement:

#1: "The statement that the ferruginous hawk is considered to be highly sensitive to any disturbance, while common red-tailed hawks are much less sensitive, is misleading. That is, there are some nesting territories of Ferruginous Hawks and Northern Goshawks that have been taken over by Red-Tailed Hawks in response to other prior disturbance. We suggest adding this information to this section. Noting the aforementioned concern, please provide a citation supporting the statement Raptor species may variably habituate to human activities, and often construct nests." (#12-15)

Agency Response: This statement was from the 1999 draft EIS. The reference could not be found in the files so the statement has been deleted.

Public Concern #43: *The Forest Service should state how the CSU stipulation will protect elk winter range.*

Sub-concern:

#1: Explain in greater detail how the process to allow exceptions for elk stipulations will be made.

Sample Statement:

#1: "Elk — How will CSU protect winter range?"

- A study in open habitat at Jack Morrow Hill in Wyoming observed that elk avoid areas within 1.2 miles of roads and active oil and gas wells in the summer and within 0.6 miles of these feature in the winter (Powell 2003).
- Phillips and Aidredge (2000) observe that human disturbance during the calving season reduces elk calving success rates and recommend maintaining "disturbance-free" areas during the calving season, based on work in alpine areas in Colorado.
- Exceptions - state that exceptions may be granted if reclamation will improve habitat. How will reclamation be done? Who would be involved? How would that decision be made?" (#14-9)

Agency Response: Page 4- 11 of the FEIS explains how CSU stipulations would protect elk winter range. The CSU stipulation would allow only a certain amount of disturbance within an area at one time (FEIS page 4-11). Most elk calving occurs within riparian areas, which are covered by a NSO stipulation in all action alternations (FEIS page 4-16).

Public Concern #44: The Forest Service should include pronghorn in the analysis.

Sample Statement:

#1: “Pronghorn — the draft EIS does not mention pronghorn. Why is that? If there are pronghorn found within the planning area, how will they be impacted by oil and gas development? What considerations will be made within the plan?” (#14-12)

Agency Response: Pronghorn are not among the list of species mandated for analysis: Federally threatened, endangered, or candidates; species addressed in the Migratory Bird Species Act; Forest Service “sensitive”; or Forest Plan Management Indicator Species. Habitat occupancy for pronghorn on the Forest is minimal. Pronghorn spend the majority of their time on the BLM lands adjacent to the Forest, but can be seen along the fringes of the two mountain ranges within the pinyon/juniper where springs are located.

2.3. Hydrology/Soils

Public Concern #25: *The Forest Service should provide additional information on the existing condition and affects to water resources and water rights (springs, groundwater, streams, etc.).*

Sub-concerns:

#1: Including effects of the Southern Nevada Water Authority groundwater pumping project and proposed power plants that may be built near Ely.

#2: Provide information of water rights within the project area including names of holders.

#3: What impact will oil and gas operations have on spring flows in the project area.

Sample Statements:

#1: “Do the affected aquifers extend in to Utah? How will this action affect inter-state aquifers? Who are the water rights holders that may be affected by these activities? Are the water resources in the region over-allocated? Who are the larges water rights holders? How will the proposed development of a coal-fired power plant near Ely further deplete aquifers that Oil and Gas will be tapping? How much water would be used by OG development across the Grant-Quinn lands were leased, and wells developed, as foreseen in the EIS? What if twice as much was developed? How much water underlies these lands? How will piping water to Las Vegas in the aftermath of the recent Lincoln County legislation affect aquifers that will also be tapped or affected or disturbed in Oil and Gas exploration or development here? How will various energy actions (explo and development as described in the DEIS) affect spring flows in this region? Please conduct baseline inventories, assessment and analysis necessary to understand the impacts to water resources, as discussed below.” (#10-8)

#2: "For all streams and springbrooks in or related to the project area and species of interest, the Forest must assess the following: How has vegetation been changed, reduced, eliminated? How have channels been widened or degraded? Have water tables been lowered? Has erosion potential increased?" (#10-25)

Agency Response: The EIS has been reviewed for adequacy of information regarding water resources; needed additions have been included in Chapters 3 and 4 of the FEIS.

In response to sub-concern 2, it is outside the scope of this EIS to provide detailed information on water rights holders. This information is available from the State Engineer's Office. Water rights and possible effects to holders will be addressed at future planning stages.

In response to sub-concern 3, potential impacts to spring flows has been included in the EIS in section 1.5 of chapter 4. During future planning stages the Forest Service will assess the extent of surveying needed to determine impacts on springs and other water resources.

Public Concern #32: *The Forest Service should consider soil erosion potential as well as slope in developing lease stipulations.*

Sub-concern:

#1: How was the 40% grade chosen for protection of soil resources.

Sample Statements:

#1: "Soil types should be incorporated into the programmatic-style stipulations and lease restrictions regarding erosion hazards. Basing the stipulations and restrictions on slope alone does not take into account the erosion potential of local soils. Soils of an unstable nature will readily erode on mild slopes while well-integrated soils may erode marginally on extremely steep slope conditions. Both soil type and slope must be considered to properly identify and implement the stipulations and lease restrictions concerning erosion avoidance." (#12-2)

#2: "NSO stipulations will apply to resources with slopes >40%. Why 40%? How was that grade chosen? Will it adequately protect the resources that it claims it will? We would like to see the rationale for choosing 40% slope and see if there is not a lesser grade which would better protect the ecological resources of the area." (#14-19)

Agency Response: Section 3.1.2.7, page 3-43 in the FEIS explains that hillslope angle is a good general index of the potential for development-related impact to soil resources. Therefore, slope was used to estimate general soil erosion hazard areas for the Project Area. Several references are given where slope has been used to predict erosion hazard in other areas.

Public Concern #49: *The Forest Service should ensure that well logging activities involving radioactive materials are licensed with the state of Nevada.*

Sample Statement:

#1: "Well logging activities involving radioactive materials must be licensed the Nevada State Health Division." (#94-1)

Agency Response: All permits will require operators to comply with local, state, and Federal requirements.

Public Concern #50: *The Forest Service should ensure that Nevada Revised Statutes regarding water resources are followed.*

Sample Statement:

#1: "All waters of the state belong to the public and may be appropriated for beneficial use pursuant to the provisions of Chapters 533 and 534 of the Nevada Revised Statutes and not otherwise. All use of drilling water and/or dust control water shall be pursuant to waiver or permit issued by the state engineer. A waiver to drill a temporary water source well to support oil and gas drilling operations may be granted by the state engineer upon request. All boreholes or wells shall be plugged and abandoned in compliance with Chapter 534 of the Nevada Administrative Code. If flowing water is encountered it shall be controlled as required in MRS 534.060(3)." (#95-1)

Agency Response: Granting of leases and drilling permits for oil and gas exploration on National Forest System lands is a process subject to Federal and state regulations (page 3-56 of FEIS). Table 3-8 on page 3-57 gives a brief overview of some of the state and Federal regulations regarding groundwater use for oil and gas leases. Page 3-57 of the FEIS refers to the Nevada statute that allows waivers of ground water withdrawal permits for oil, gas, or geothermal exploration projects.

2.4. Recreation/Visuals

Public Concern #9: *The Forest Service should reclassify the "Modification" and "Maximum Modification" areas in the Quinn Canyon Range.*

Sub-concern:

#1: To protect scenic values.

Sample Statement:

#1: "Based on my direct observation of the southwest area of the Quinn Canyon Range, I also wish to object to the classification of that area as "Modification" and "Maximum Modification" for the purposes of protecting Scenic values." (#78-4)

Agency Response: Visual Quality Objective classifications were established in the Forest Plan (1986). Changing classifications is outside the scope of this EIS; note, however, that the Forest Plan is currently under revision and that scenic quality is being re-addressed.

Public Concern #55: *The Forest Service should exclude road construction, power lines, pipelines, and other ground disturbance from Primitive Recreational Opportunity Setting (ROS) areas.*

Sample Statement:

#1: "NSO stipulations for Primitive areas should be modified in order to exclude road construction, power lines, pipelines, and other works of man.

- **Modification** - How will the decision be made to determine whether limited development will have minor effects to the primitive setting? What factors will be considered? Who will make that decision?" (#14-14)

Agency Response: Placement of roads, powerlines, and other linear features would be done in accordance with Forest Plan standards and guidelines. Current forest plan direction allows construction of these facilities within primitive ROS areas. Site-specific analysis done at future planning stages (i.e., surface use plans and field development plans) would consider effects to the primitive ROS setting and consider different alternatives aimed at mitigating potential effects.

Public Concern #59: *The Forest Service should address how it will handle modifications to the stipulations for the Recreational opportunity spectrum.*

Sample Statement:

#1: "Modification how will the decision be made to determine whether limited development will have minor effects to the primitive setting? What factors will be considered? Who will make that decision?" (#14-14)

Agency Response: Page 2-7 of the FEIS has been revised to better address how modifications are handled at the project-level planning stages. The determination on whether or not to grant a modification for recreation resources would be made by the Forest Service after a site-specific review of the modification request. This would be done at future planning stages or later once operations have been approved under surface use plans or field development plans. Factors to be considered may include: type of activity, location of activity within the primitive area, duration of activity, distance from wilderness, and distance from dispersed camping areas. Regulations at 36 CFR 228.104 would be followed when consideration is given to granting modifications.

2.5. Heritage Resources

Public Concern #10: *The Forest service should consult with affected Native American tribes concerning the effect of leasing on properties of religious or cultural significance.*

Sub-concern:

#1: To protect the integrity of sacred sites and cultural landscapes.

Sample Statement:

#1: "The SHPO strongly recommends that the U.S. Forest Service initiate consultation with affected Native American tribes concerning the effect of this undertaking (leasing) on properties of religious or cultural significance. Sacred sites or cultural landscapes often possess aspects of integrity such as setting and feeling that could be adversely affected by the activities associated with oil and gas extraction." (#93-1)

Agency Response: The Forest Service has met with three affected Native American tribes to discuss the project and request their input concerning cultural resources and sacred sites. The Forest Service has not received any substantive input from the tribes that would require reconsideration of analysis. At the leasing and project-specific stages, tribes will again be consulted to assure the protection of cultural and sacred sites and important cultural landscapes.

Public Concern #30: *The Forest Service should protect cultural and heritage resources by not allowing leasing or by applying the No surface Occupancy stipulation.*

Sample Statement:

#1: "No Lease stipulations with our recommended modifications should exclude areas such as identified on Pg. 3-79." (#14-15)

Agency Response: Cultural resources and heritage resources would be protected in accordance with the National Historic Preservation Act and other applicable laws. The type of mitigation required would be determined at future planning stages and may include avoidance and site recordation.

Public Concern #58: *The Forest Service should address cumulative impacts to cultural resources.*

Sample Statement:

#1: "A site-specific inventory of proposed ground disturbances would not necessarily address the larger cumulative impact of widespread oil and gas leasing." (#93-2)

Agency Response: Cumulative impacts to cultural resources are addressed in the FEIS on page 4-52. During future planning stages, cumulative effects will again be addressed during site-specific project environmental analysis, a requirement under the National Environmental Policy Act. Site-specific inventories of resources will assist the specialists in determining impacts and mitigation requirements in accordance with the lease's standard lease terms and stipulations.

2.6. Inventoried Roadless Areas

Public Concern #7: *The Forest Service should not allow leasing in inventoried roadless areas.*

Sub-concerns:

- #1: To protect the undeveloped primitive characteristics of inventoried roadless areas.
- #2: To protect the recreational, Scenic, ecological, and cultural values within these areas.
- #3: To ensure that these areas remain intact for future generations.

Sample Statements:

#1: "I strongly oppose leasing for oil and gas development in all Inventoried Roadless Areas and on any lands within the Citizen's Proposed Wilderness Areas, including additions to the Currant Mountain Wilderness, Red Mountain, Circle Wash-Deadman, White Pine Range and Shellback as identified by the Nevada Wilderness Coalition. As a public land owner and user, I value these areas' abundant and varied wildlife, clean riparian and water resources and the diversity of recreational, sporting and agricultural resources." (#3-1)

#2: "Your preferred alternative provides few constraints and would not sufficiently protect US Forest Service Inventoried Roadless Areas and citizens' proposed wilderness areas. To protect the roadless, ecological, and cultural characteristics of these places, the areas must not be leased." (#82-3)

#3: "The White Pine, Grant and Quinn Ranges are one of the least known areas of our national heritage. They are beginning to receive recognition for their values for wildlife and wilderness in a dramatic desert mountain landscape. I urge the Forest Service to take a stand for strong protection of these wild mountains." (#87-4)

Agency Response: The Forest Service recognizes the importance of the values associated with inventoried roadless areas. The three action alternatives provide varying levels of protection for IRAs. Impacts are discussed on pages 4-34 to 39 of the FEIS. Protection of these roadless areas will be a key consideration in the decision process.

2.7. Analysis Process

Public Concern #1: *The Forest Service should consider and incorporate direction from the Energy Policy Act of 2005 and the Forest Service's energy mission statement.*

Sub-concerns:

#1: To provide for energy needs of the nation.

#2: To "balance this with the critical need we face as a nation for developing our own energy resources."

Sample Statements:

#1: "The recently passed comprehensive Energy Bill encourages greater exploration for energy sources. Shouldn't those provisions have been included in this Draft Environmental Impact Statement?" (#46-1)

#2: "We need to use our resources to alleviate critical national energy needs." (#53-1)

Agency Response: The Energy Policy Act of 2005 and the Forest Service's National Minerals Policy has been considered in the EIS (see pages 1-6 and 7 of the FEIS).

Public Concern #2: *The Forest Service should consider local plans and policies.*

Sample Statement:

#1: "The proponents should ensure that all local plans and policies are reviewed, recognized and considered in a public and transparent manner." (#7-4)

Agency Response: The Forest Service has been and will continue to involve the local county governments in the analysis of this project. Consideration has been given to local plans and policies (see page 2-3 of the FEIS).

Public Concern #4: *The Forest Service should not make any leasing availability decisions until the White Pine County Lands Bill is complete.*

Sub-concerns:

#1: To protect wilderness characteristics of inventoried roadless areas, thus not preventing these areas from being designated as Wilderness in the future.

#2: Making a leasing availability decision while discussions and negotiations regarding wilderness designations are ongoing could disrupt the process.

Sample Statements:

#1: "We strongly encourage the Forest Service to not make any decisions regarding oil and gas leasing on any citizen's inventoried wilderness areas and USFS Inventoried Roadless Areas (IRA) until the White Pine County public lands bill is complete. We feel that this is a fair request and one that could prevent an area with local support for protection from being exploited by the oil and gas industry." (#14-1)

#2: "If you go forward with this leasing proposal, it will interrupt a very promising negotiation now in progress that could produce agreement on which areas will be protected as wilderness." (#65-2)

Agency Response: These comments were received prior to the Lands Bill being signed in to law on December 20, 2006. Upon signing, the lands designated as wilderness became legally unavailable for leasing.

Public Concern #5: *The Forest Service should include additional direct, indirect, and cumulative effects analysis.*

Sub-concerns:

#1: To address full-field oil and gas development and the infrastructure needed to support oil and gas activities (examples include airstrip, housing, pipelines, and utilities).

#2: To detail possible affects to multiple use stakeholders.

#3: To provide detailed descriptions of past, present, and future projects such as hard rock mining, Southern Nevada Water Authority's groundwater projects, and utility corridors.

#4: To address affects to resources such as hydrology, soils, vegetation, wildlife, roadless areas, and weeds.

#5: To assess the degree of desertification caused by past, present, and future activities including livestock grazing and oil and gas activities.

Sample Statements:

#1: "The initial leasing proposal could easily lead to major, full-field development. The EIS must fully assess the cumulative impacts of development on that scale. These include noise and light pollution, as well as the associated affects of pipelines and habitat fragmentation." (#4-5)

#2: "The proponents should carefully consider and detail all land use implications and detail possible affects to multiple use stakeholders." (#7-5)

#3: "The Department requests that indirect impacts be more fully assessed for all Action Alternatives, especially for Peregrine Falcon, all bats, and the Three-toed Woodpecker. Additionally, the Department requests that impacts from noise be expanded to include an evaluation of impacts from low frequency noise emissions and vibration (e.g. effects to raptors and Sage-Grouse)." (#12-16)

#4: “What direct, indirect, synergistic and cumulative impacts may any of these projects have on species, waters, watersheds, aquifers and other important values or resources that may be affected by oil and gas exploration and development under this EIS?” (10-7)

Agency Response: The Forest Service reviewed the effects analysis for all resources and made changes as needed to better describe the effects. Please note that the availability analysis is a programmatic analysis and that site-specific analysis is completed at future planning stages.

Response to sub-concern #1: Leasing regulations require the effects analysis be based upon the reasonably foreseeable development scenario. Analyzing a full-field development scenario is outside the scope of this analysis.

One commenter stated that any development would have: “a small community to house the oil worker’s families, many miles of new paved roads and an airfield, and pipeline construction”. Our analysis indicates that (1) the existing communities can supply housing for workers, (2) the existing paved road network in the tri-county area is adequate for main access and that only gravel or dirt roads would need to be constructed for access within the Forest boundaries, and (3) that new airstrips would not be needed due to the limited development anticipated. The reasonably foreseeable development scenario also states that some pipeline construction would be required.

Response to sub-concern #2: In response to the comment about effects to multiple use stakeholders, it was determined that the updated effects analysis described in Chapter 4 adequately describes the potential effects on other users on the National Forest System lands (i.e., hunters, campers, permittees, etc.).

Response to sub-concern #3: The cumulative effects discussion has been revised as needed to identify the past, present, and reasonably foreseeable future actions that are covered in the analysis. The boundaries for the cumulative effects analysis have also been identified.

Response to sub-concern #4: The direct and indirect effects discussion sections have been revised as needed to better describe the effects on surface resources.

Response to sub-concern #5: To our knowledge, there is no documentation of desertification within the Project Area. It is outside the scope of this EIS to address all the grazing issues mentioned above. If necessary, these will be addressed on a site-specific basis at the APD stage.

Public Concern #6: *The Forest Service should include the Wilderness Act of 1964 and the Nevada Wilderness act of 1989 in Appendix B of the EIS.*

Sample Statement:

#1: “This section should include The Wilderness Act (1964) and the Nevada Wilderness Act (1989).” (#14-21)

Agency Response: Reference to these two acts has been included in Appendix B of the Final EIS.

Public Concern #11: *The Forest Service should disclose information on past or pending oil and gas exploration and leasing EIS’s or EAs in Nevada.*

Sub-concern:

#1: To address environmental impacts that have occurred.

Sample Statement:

#1: "Has exploration already occurred across these Forest or Ely BLM or other lands? If so, where has this been authorized? Please provide maps. We do not recall seeing any Forest or BLM documents authorizing exploration activity. What have the environmental impacts of any exploration been?" (#10-2)

Agency Response: It is outside the scope of this document to analyze NEPA documents related to past oil and gas exploration activity on NFS and BLM-administered lands. The Forest Service, however, administers mineral operations on the Humboldt-Toiyabe National Forest according to the standards in the 36 CFR 228 regulations and in accordance with best management practices.

Public Concern #14: *The Forest Service should provide adequate time for the public to review and response to the DEIS.*

Sample Statement:

#1: "I am particularly concerned about the short amount of time for comments from the general public, many of whom have no idea of what is contemplated." (#11-1)

Agency Response: While the Forest Service recognizes that the public may have different expectations for reviewing environmental documents, the 45-day comment period was deemed adequate, especially considering that an updated scoping letter was also sent out in June of 2005. The 45-day comment period is in compliance with Forest Service Regulations at 36 CFR part 215.

Public Concern #15: *The Forest Service should provide additional information on how roadless areas are managed under Amendment No. 1 to the Humboldt Forest Plan.*

Sample Statement:

#1: "Forest Management Direction — Amendment No. 1 to the Humboldt Forest Plan stated that 'Roadless areas not designated as Wilderness will be managed for uses other than Wilderness and will be re-evaluated in further Wilderness considerations during the next planning period.' What was the time frame for that plan and that specific amendment? It is unclear what the context is for 'not designated Wilderness'. Under which legislative effort does that refer to?" (#14-17)

Agency Response: The Forest Plan was approved in 1986 and amendment #1 was approved in June of 1990 following the passage of the Nevada Wilderness Act of 1989. Amendment #1 stated that lands not designated as wilderness in the 1989 Act would be managed for uses other than wilderness. The amendment also stated that roadless areas not designated as wilderness under the 1989 Act would be re-evaluated in further wilderness considerations during the next planning phase.

Public Concern #16: *The Forest Service needs to correct inaccuracies in the maps.*

Sample Statement:

#1: "Also wish to object to the erroneous omission and mislabeling of the map 'Figure 3-18: White Pine Division, Wilderness and Inventoried Roadless Areas (IRAs)' on page 3-65. The map shown

there is for the Grant-Quinn Division, Wilderness and Inventoried Roadless Areas (IRAs) and seems to be also shown in its proper location on page 3-66. The proper map for 'Figure 3-18: White Pine Division, Wilderness and Inventoried Roadless Areas (IRAs)' on page 3-65 should be provided to the public and the comment period extended so that a fair consideration of the corrected DEIS can be made and the corrected DEIS commented upon by the public." (#78-5)

Agency Response: DEIS Figures 3-18 and 3-19 are in their correct location and the labels do not show errors. Perhaps some printed copies of the EIS had some pages out of order. All maps have the timing lease stipulation overlapped across all areas regardless of leasing for ease in map preparation. No activities will take place in "no lease" areas.

Public Concern #26: *The Forest Service should conduct inventories and surveys related to existing natural resources.*

Sub-concern:

#1: To better understand existing conditions and analyze affects to resources of concern.

Sample Statements:

#1: "Multiple surveys are needed to measure discharge, which may vary seasonally or otherwise. The Forest must research any existing information on spring characteristics – flow rates, aquifer depletion, your own records and project files regarding any spring or other developments, any water rights filings, any water rights surveys done by BLM, etc." (#10-16)

#2: "Macroinvertebrate and vegetation surveys should be conducted prior to implementing management actions that may adversely affect spring biota (Sada and Herbst 2001 at 14). These also serve as an environmental baseline to gauge any management changes. In order to be able to understand cumulative, synergistic or indirect impacts of proposed actions (and to adequately understand current conditions)." (#10-23)

#3: "The Forest must systematically inventory native fauna present in and near springs, seeps and springbrooks, over at least two years." (#10-13)

Agency Response: Multiple surveys of springs throughout the 569,000-acre Project Area is beyond the scope of this EIS. At future planning stages, springs may be surveyed on a site-specific case-by-case basis to determine the degree of surveying needed. General information on some of the major springs in the Project Area is provided on FEIS pages 3-54 through 3-57. FEIS Pages 3-57 and 3-58 provide some general information on basin yields and committed resources. At future planning stages it will be determined which types of surveys need to be completed in and around springs that may be affected by oil and gas exploration and drilling and associated activities.

Public Concern #35: *The Forest Service should explain the role of BLM in oil and gas administration.*

Sub-concern:

#1: Include the BLM sensitive species in the analysis.

Sample Statement:

#1: “In view that the Forest Service and BLM have separate but joint roles in the administration of oil & gas activities addressed in this DEIS, why are no related BLM actions stated here? For example, analyses regarding BLM Nevada’s Sensitive Species as they relate to the DEIS in a direct or indirect manner are not considered. Will BLM Sensitive Species be addressed in a separate BLM document? If a statement of specific BLM roles or actions is administratively.” (#12-7)

Agency Response: At the leasing availability stage, the FS is responsible for determining what lands are available; the FEIS has been updated to clarify the BLM’s role in leasing stages. See FEIS page E-6 for clarification of FS and BLM roles in exploration drilling permitting process. The Memorandum of Understanding signed by the BLM and Forest Service in April of 2006 provides background information on the roles of both agencies.

Concerning the List of Sensitive Species for BLM; consideration of this list is outside the scope of the analysis because the availability analysis and decision is limited to National Forest System lands.

2.8. Vegetation

Public Concern # 18: *The Forest Service needs to better explain where the riparian buffers begin.*

Sub-concern:

#1: To determine if their size is adequate to protect riparian vegetation.

Sample Statement:

#1: “It is unclear how riparian buffers proposed in Alternatives 3 & 4 are to be implemented. Does a buffer begin at the edge of the riparian, obligate vegetation type or at the water’s edge? Is the buffer demarcated from 30 feet (15 feet for ephemeral wash) from one side of the riparian area or 15 feet (7.5 feet for ephemeral wash) from the center of the riparian area? Of concern is that these buffers as stated do not seem of adequate size to protect the riparian vegetation and meadow systems associated with the riparian areas, especially in the event of oil spillage or other incident of unanticipated contamination.” (#12-3)

Agency Response: The buffers of 30 and 15 meters stated on page 3-23 of the FEIS were set to delineate the riparian zone where NSO stipulations would apply. The buffers would be set from the edge of the riparian zone. Beyond the buffer zone, standard lease stipulations would apply that allow for moving a drill site or other facility up to 200 meters. When combined, the 200 meter distance plus the 15- or 30-meter buffer would adequately protect riparian resources.

Public Concern #19: *The Forest Service needs to provide details on habitat fragmentation that would occur following exploration and development.*

Sub-concern:

#1: To determine the affects on wildlife and sensitive species.

Sample Statement:

#1: "The wildlife values of the region are matchless. It is essential that the EIS detail the habitat fragmentation that would follow road and well-pad construction and what such fragmentation would mean to sensitive species." (#82-6)

Agency Response: The Forest Service used the reasonably foreseeable development scenario to estimate the effects of fragmentation that could occur. At future planning stages other NEPA documents would be prepared in more detail for surface use plans. Fragmentation will be analyzed and sensitive plants/animals with potential habitat within the area will be surveyed and/or analyzed at that time.

Public Concern #24: *The Forest Service should include reclamation history of past and present oil and gas activities.*

Sample Statement:

#1: "What has been the reclamation history of existing Oil and Gas activities in Nevada and other public lands? Have any Nevada drill sites been reclaimed? What is their current condition?" (#10-36)

Agency Response: Two exploration holes were drilled on the east side of Moorman Ridge in the northeast part of the White Pine Range in the late 1980's and early 1990's. Reclamation was completed, including plugging the well; recontouring the drill pad, mud pit and access road; and seeding and mulching. The current condition meets state reclamation standards. Discussion of other oil and gas activities is outside the scope of this analysis, except when needed to properly disclose cumulative effects.

Public Concern #28: *The Forest Service should manage wet meadows, springs, and riparian vegetation under the same protection as riparian zones.*

Sub-concern:

#1: To protect crucial foraging habitats for wildlife.

Sample Statement:

#1: "Riparian habitats are of critical importance to wildlife in Nevada. The water resources and associated habitats provide critical habitat components for the majority of wildlife species in the project area whether aquatic or riparian obligates or terrestrial. Riparian habitats represent a mere ½ percent of the planning area but should enjoy full protections under all alternatives. Stringer meadows in Nevada provide crucial foraging habitats for raptors and Sage Grouse, and play a pivotal role in the retention of water for many stream and spring systems. Hence, meadow systems should be included under riparian protections or be identified under their own set of resource stipulations." (#12-18)

Agency Response: The Forest Service recognizes that wet meadows provide important wildlife habitat in the project area and that these areas are also important watershed features. The stipulation tables in Chapter 2 have been revised to clearly state that wet meadows would be included in the list of riparian areas protected with the NSO stipulation.

Public Concern #45: *The Forest Service should protect aspen stands in all alternatives.*

Sample Statement:

#1: “Aspen stands provide valuable habitat components for big game, raptors, bats, and numerous other sensitive wildlife species. Strong and equal protections of aspen habitats should be required under all alternatives. (#12-19)

Agency Response: All alternatives provide protection for aspen stands in varying degrees. Alternative 2 has a NSO stipulation; under Alternative 3 the stipulation is CSU, and under Alternative 4 protection is provided by SLTs. This range of mitigation provides the range of alternatives required to be analyzed under the National Environmental Policy Act. Common to all action alternatives is the stipulation of NSO to all riparian areas. This also offers protection to aspen stands which are often associated with riparian areas.

Public Concern #57: *The Forest Service should provide information on Research Natural Areas in the project area.*

Sample Statement:

#1: “What areas on these lands have been nominated as RNAs, or are RNAs? Why have you not considered alternatives that prohibit energy activities in these areas?” (#10-39)

Agency Response: Within the project area there are two designated RNAs: White Pine Peak and Troy Peak. Both are located in wilderness and would not be affected by any leasing that would occur outside the wilderness. Also, there are no other areas pending review or designation within the project area; therefore, no further discussion on RNAs is needed.

Public Concern #53: *The Forest Service should include specific information on reclamation requirements and procedures.*

Sub-concern:

#1: Reclamation should be monitored.

#2: Include contingency measures in lease stipulations if initial restoration efforts fail.

Sample Statements:

#1: “Any post-disturbance rehab. Must include complete recontouring of any disturbed lands. It must also include a guarantee that no decline in aquifers, spring flows or other resources will occur as a result of this activity. Constant monitoring of all water resources must occur and be funded by the energy company throughout exploration or development. This must also include a detailed study as part of this EIS, and a new site-specific study at each proposed development area.” (#10-43)

#2: “The Final EIS should describe the specific lease stipulations for road closure and restoration measures to address the issues outlined below. The ROD should commit to all relevant and appropriate lease stipulations.

- Removal of culverts and all other drainage structures;
- Stream channel restoration;
- Rehabilitation of springs, seeps, and meadows to stable condition;

- Recontouring and/or outslipping to return roaded areas to natural hydraulic function;
- Stabilization of roads and other disturbed areas;
- Tillage, ripping, fertilization, mulching with weed-free straw, and revegetation with native seed mix;
- Irrigation and/or timing requirements for revegetation to take advantage of the growing season; and
- Stabilization of active mass failures on slopes.” (#89-3)

Agency Response: Specific discussions on reclamation and monitoring are outside the scope of this EIS and will be addressed at the site-specific project level. General information on reclamation may be found in the FEIS on page 1-12 and additional details are provided in Appendix E. This appendix addresses abandonment of wells, reclaiming the land to a stable and productive use, and release of the bond after the results are inspected and accepted by the Forest Service and BLM.

2.9. Leasing Process

Public Concern #12: *The Forest Service should provide additional information on leasing nominations and how the analysis area was determined.*

Sample Statement:

#1: “Who nominated these areas for development/exploration/leasing? How did you determine the analysis area?” (#10-31)

Agency Response: Specifically naming who submitted nominations for oil and gas leasing in the project area is outside the scope of the analysis. The determination of the analysis area was based on leasing nominations, manageable size for the project, Ely Ranger District management units (mountain ranges), and landscape ecological units.

Public Concern #46: *The Forest Service should include information on current oil field production in Nevada.*

Sample Statement:

#1: “Please provide all information related to productivity of field – are these wells at all productive? If so, how much oil and gas have they produced? Where is it processed?” (#10-35)

Agency Response: Appendix C provides background information on oil field development history adjacent to project area. The FEIS has been updated to include current information on oil production within Railroad Valley.

Public Concern #47: *The Forest Service should include additional information on seismic methodology and activities.*

Sample Statement:

#1: "Seismic Methodology, how will this be done? It is unclear as which types of seismic surveys will be utilized and how that decision will be made. Furthermore, the type of seismic activity will have an effect on the ground. Where in the document are the cumulative impacts to seismic exploration addressed? Is it true that during previous seismic exploration in some of the existing roadless areas that the USFS required some of the seismic exploration be done under NSO stipulations (i.e. by foot or by helicopter)?" (#14-22)

Agency Response: Please see page E-5 of appendix E for seismic information. At this time, we do not know what industry will propose for seismic projects and what methods they will use. At the site-specific project level, additional environmental analysis and permitting will be completed. In addition, our files do not show that past seismic exploration projects were accomplished by foot or helicopter.

Public Concern #56: *The Forest Service should provide information on split estate lands.*

Sample Statement:

#1: "How much of the land is a split estate? Is development on split estate lands conducted separately - or analyzed as part of this process." (#10-27)

Agency Response: Split estate means that one entity owns the surface and one owns the mineral rights. While an exact amount on acreage of split estate lands within the Project Area is not available, it is assumed that the majority of National Forest System lands lie over minerals managed by the BLM. An analysis of leasing on split estate lands is not within the scope of the EIS. When the Forest Service manages the surface and a private entity or State owns the mineral rights, then the Forest Service can not make the mineral estate available for leasing because the BLM has no authority over the distribution of the mineral estate.

2.10. Economics

Public Concern #23: *The Forest Service should provide additional information on the economic impacts of the proposed action and alternatives in the EIS.*

Sub-concerns:

#1: To disclose the potential loss of tourism-related activities (hunting, fishing, wildlife-viewing, and other outdoor activities).

#2: To disclose the potential revenues that would be generated by exploration, development, and production of oil and gas.

Sample Statements:

#1: "Further, it must consider the economic damage from the loss of hunting, fishing, and other outdoor activities."

#2: "The revenues that would be generated by a successful oil and gas presence on national lands would be of tremendous present and long range benefit to those areas that would be developed." (#63-3)

Agency Response: The Forest Service recognizes the importance of an adequate economic analysis. The Economics section in Chapters 3 and 4 has been appropriately updated and additional information provided in response to the concerns raised.

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